COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER AND R. DAWSON HALL, *Editors.*

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Right to Exclude and to Hire

JOHN L. LEWIS is much troubled about the mysterious workings of martial law. The union, of course, has nothing against law of that kind, only it must work for the union and not against it. When David Robb and other representatives of the international union, who had gone to the Tug River region ostensibly to manage union funds but really to foment trouble, were compelled to leave the State of West Virginia, John L. Lewis naturally enough said, "It is brutal work," speaking, of course, of the action of the state authorities and not of any union activity.

The union had nothing to say, however, when early in 1914 Secretary of War Garrison during a reign of martial law in Colorado forbade the hiring of any new men at the mines or the opening of any plants that were not in operation before the Ludlow battle.

The union can handle its affairs through citizens of Mingo County as readily as by outsiders, and the court does not want to interfere with the union but merely to prevent the invasion of Mingo County. The officials guarding that region believe that the best way to keep order is to prevent persons coming in to reinforce the union, which started the strike and has supported it. They particularly oppose their meeting together for united action. Nothing is clearer than the right of the government under martial law to exclude whom it will and to regulate assembly, though the right to work and to operate works has almost never been denied. This, however, was done in Colorado.

Danger in Inaction Based on False Security

RUNNING through the mind of the men in the coal industry there is a lurking suspicion that amounts almost to fear that the ghost of regulation has not been permanently laid. By prodigious effort the Calder and then the Frelinghuysen legislative proposals were shelved, but no one really thinks that the matter has been finally settled for all time, and the idea is current that but the spark of another period of high prices for coal is needed to start the train of powder that leads to the magazine in Congress. The time to dig a cyclone cellar or build an ark is between storms. The chances of there being another flood at Dayton are remote, mathematically speaking, but since 1913 the people in the Miama Valley have been developing a series of dams to protect them from a recurrence of that disaster.

Putting hobbles on business is not a normal procedure for our national legislators. Congress, in the main, does only those things that it is forced to do. Tremendous pressure and, generally, years of persuasion are required to accomplish those things that appear to many as obviously proper, and drastic laws are adopted only when they at least appear to represent the popular will. To mention only some of the more prominent steps in our legislative history it is only necessary to refer to abolition of slavery, regulation of the railroads, prohibition, woman suffrage, the Federal Reserve system, to realize that Congress acts in large matters slowly. Congress knows that the country is today reacting away from the theory of regulation of business and therefore Congress is not going to regulate business.

The danger to coal, however, is that the public has set coal aside and apart from business and has put it in a class with at least two other industries, the railroad and the packers. These the public have come to view not as business but as particular enemies. It is very difficult for the coal man to appreciate this. You know that you are conducting your affairs according to the best of your ability, that you have for years had a hard time to make a profit in your undertaking and that for some years you have had the opportunity with other business to make good profits, but that times are bad again. You cannot see why coal should be one of the few lines of effort singled out for chastisement, for you can name a score of other lines of activity that have much the same record as coal.

It is a condition, not a theory, that confronts the coal industry. It is told that a debating society in the backwoods once considered the question, "Resolved, that whereas the present ratio, 3.1416, between the diameter and circumference of a circle is a cumbersome and arkward figure, the ratio should be changed to 3." It is further related that the pros won the decision. It is not necessary to argue the question of the public attitude on coal, but to study it and seek to meet it by education. Coal may dig fire trails, beat out sparks and start backfires, but everyone who has seen a real forest fire in action knows that the flames jump the trenches, the sparks come to life and backfires fail at times. The thing that saves the day is a change in the direction of the wind. Place no confidence in a calm.

A serious fire has swept over the coal industry. Some of the underbrush is charred but the sound timber is not hurt. The sparks are still glowing, though the wind has fallen. Antagonisms have been engendered by the viciousness of some of the backfires. Some people are so busy turning over the embers trying to find the incendiary who started the trouble that they cannot see that they are treading on hot coals. Some are coming out of the thicket with all the outer habiliments of a chimney sweep and would like to rub some of the black off on others.

Weeks, if not months, must elapse before there is any possibility of a recurrence of demand for coal sufficient to produce a car shortage and consumer bidding for coal at high prices. Quite possibly there will be no high prices this winter such as will fan the sparks to flame. The coal industry may not experience for another generation such a period of runaway market as has been recorded in recent years. There is danger, however, so long as a single spark of the last fire glows. The wind

can be trained to prevent the spread of the fire. Public opinion can be veered and further trouble forestalled. For one thing, the public cannot now see the big, sound timber for the underbrush. Without underbrush a fire makes little progress.

At this point we stand amended. Some one interjects that a rain would quench the fire. Yes, particularly if it were a rain of reason.

Now that the tumult and the shouting have subsided we may hear the quiet voices of those who have more moderate views, but who have been loath to wade into a bitter battle of words. These men, a surprisingly large number of them, are not content to fight public opinion with injunctions and with tactics that bear all outward semblance of trying to keep the facts from the government and the public. Some men, you know, casting an eye over the balance sheet of the past ten or twenty years, resent the idea that they are coal barons, and would like the consumer to become better acquainted with the facts. Permanent peace for coal lies along the direction of meeting the public and not fighting it. It is fundamental that the coal industry should recognize that it is one of a few singled out by the common people as deserving special treatment. The coal industry must, therefore, meet the situation by special treatment on its part.

Research Scholarships

NOTING how fortunate members of the United States Bureau of Mines and research men at universities have been in obtaining good places in the coal industry and in the industries by which the coal mines are equipped, it would seem strange that these organizations find it difficult to keep well staffed, but it is a fact that they are perpetually looking for men.

There is always room for men who know more about any given subject than does the industry they serve. The opportunity given to graduate engineers to experiment at a well-fitted station, with most of their living expenses paid by a scholarship, would seem exceedingly attractive. It is certainly a better opportunity than they enjoyed when attending college. The advancement undoubtedly will be faster, the information they will get, though distributed free to the world, can be sold at a higher figure, the opportunities for a thorough grounding in one of the arts will be more numerous, the acquaintance they will gain will be wider, their knowledge of research, in itself a valuable form of education, will be most advantageous and their general *savoir faire* will be increased.

The opportunity to obtain at such work a salary equal to that awarded in commercial life is not likely to present itself at universities for many years. Meantime let the engineer write down the loss of the larger salary as post-graduate expenses. It is indeed well worth the cost. The loss during the one, two or three years will be more than compensated during each of the years that follow if the man who surrenders the time is really worthy of advancement.

All-around engineers with nothing but ordinary practice rarely do as well financially as these abnormally trained men, except after years of waiting for the passing of engineers, who themselves lined up for advancement in the long queue many years before. Promotion comes but slowly where the well-trodden path is chosen, for the man who would progress finds the road blocked by numbers.

Good Engineering and Safety Are One

THAT economical practice in engineering is synonymous with safety is the dictum of C. P. Tolman, president of the National Safety Council. He holds that almost every improvement in safety will be found a source of revenue and that nearly every negligence in the care of men's lives and limbs not only maims and kills but wastes material and time. This dictum applies to protective electrical devices as forcibly as to any other form of safeguard. Most mines have a circuit breaker at the power house or substation and circuit breakers or fuses at the various machines, but none to protect any one of the many lines.

The circuit breaker at the generator is set to trip at a slight overload above the normal current consumption of the whole mine or the capacity of the generating equipment. When the current demand is low, as, for instance, at the noon hour, or at night, or as a result of a stoppage on the railroad tracks that halts the locomotives in the mine, or again because of the closing down of a heavy pump or the early quitting of the mine force, an overload can occur in some one section of the mine without tripping the circuit breaker.

This piece of equipment will, it is true, accomplish what it is designed to do—that is, it will trip at certain overloads—but all loads "look alike" to the circuit breaker. It matters not that the normal load is the sum of a light load in one or many sections and an abnormally heavy one in another; its arithmetical sum alone is what the circuit breaker considers. Something grievous may be happening as the result of a short-circuit, but of this the circuit breaker is sublimely unconscious. Of course, if the trouble is at a locomotive, a motor-generator set or an undercutting machine the circuit breakers or fuses of these various mechanisms take care of the overload. But if it is the result of trouble on the line and the grounding of the short-circuit passes through coal the mine may catch fire and the master circuit breaker and those at the machines may be serenely indifferent.

Before long every section of our mines will have its own circuit breaker, which will isolate it whenever the current flow becomes excessive, yet will close automatically when the demand becomes normal or less than normal. This is already the practice at the mines of the Ford Collieries Co., the Consolidation Coal Co. and the Wisconsin Steel Co., and there are many other mines not so well known that are introducing this method of protection, which is all the more necessary where top coal furnishes an uncertain support for the trolley wire and a fiery material should the roof fall.

At some of the smaller mines of the country there is not a single circuit breaker, the owners of the property being willing to rely on fuses, though devices of this character change their reaction to current as oxidation proceeds and are always likely to be fitted with impromptu conductors or over-large fuse strips by some too-zealous employee. Such a substitution effectually prevents the "fuse" from blowing, but it provides protection to neither line, generators nor power house. Moreover it adds an appreciable and totally needless hazard to mining. In the East the real fire hazard in coal mines arises from short-circuits. In the Middle West the danger of lights may equal that of electricity. In the West the main hazard probably is lights. But East and West where electricity is used it should be closely guarded by circuit breakers.

How the Kingston Coal Company Reduces Subsidence And Conserves Coal by Rock Filling and Silting

All the Wastes in Mining Returned to Workings—Four Volumes of Water Used for Each Volume of Solid Material Silted—Pipe Put Together with Oakum and Wood Wedges—Silt Walls Do Not Run

BY D. C. ASHMEAD
Kingston, Pa.

ONE of the most difficult problems confronting the anthracite mine operator is that of supporting the surface after the coal has been removed. The need for such support becomes ever more pressing as the years go by, for only by second mining can the output of the older collieries be maintained.

In the so-called Upper Anthracite Region the coal lies nearly level and is under less cover than in other localities. In consequence the surface is easily disturbed when the coal beneath it is removed. Throughout most of this region also the population has rapidly increased, and the surface has almost everywhere been covered by buildings. This surface is rarely supported by solid coal. The pillars alone keep the roof from entire collapse. Hence it is obligatory to find a substitute for these pillars if the surface and the structures thereon are to be protected from subsidence.

How great is the magnitude of this problem may be appreciated when it is considered that the thickness of the beds of coal aggregates from 30 to 100 ft. If all this is removed and the surface let down the resulting subsidence doubtless will amount to many feet. Where the coal beds are deep this subsidence may be so controlled as to render it gradual and uniform, and consequently small damage will be done.

SUBSIDENCE FROM MINING DEEP BEDS HARMLESS

That this can be accomplished has been repeatedly proved, particularly in those localities where insufficient support has been left in the Red Ash bed and great squeezes have been brought on, which in some instances have caused the surface to settle as much as two or three feet without perceptible damage being done to either the surface or the structures thereon.

Where the coal beds lie near the surface, settlement cannot be readily controlled, and local falls occur underground which in many instances break through to the surface. These may cause total destruction of any building located where the break occurs.

Support may, of course, be provided by the use of gob pack walls, by the building of cogs or the setting of an unusual number of props. The timber used in such cogs and props, however, would require periodic renewal, and as a result the cost would be unreasonably heavy. Material should be used that will last forever and not be in any sense temporary.

At every anthracite mine large quantities of rock are produced in the mining of the coal and its preparation. This must be disposed of in some manner. At many operations it has been dumped upon the surface in great heaps or banks. This material and the rock obtained in brushing top and lifting bottom in the driving of tunnels has been brought to the surface at no little expense. All this material is available for supporting the roof in those areas where first mining has been completed.

This rock may be disposed of underground in various ways. The bottom, top and parting rock which a room affords may be built into pack walls for the support of its roof, and the rock from tunnels and headings that cannot be gobbed may be loaded into cars and dumped in worked-out chambers or elsewhere. Where steep-pitching worked-out chambers are available a horn dump may be installed at the upper end for the discharge of rock-laden cars. Such cars may also be unloaded by hand in level chambers. This material aids appreciably in filling part of the vacant spaces where the roof is to be supported by entirely filling the worked-out area.

An additional source of filling material is the rock or refuse obtained in treating the coal in the breaker. This must necessarily be brought to the surface with the coal with which it is mingled or to which it adheres. This material, being comparatively small in size, cannot be disposed of by hand with economy. The most efficacious method of transporting and stowing this small rock is by means of water through pipes, the process being variously known as "flushing," "slushing," "silting," "hydraulic filling" or "stowage." Where sufficient fine rock for this process is not immediately available, sand, gravel, ashes and clay have been used. This last-named material, however, is difficult to handle and does not yield as satisfactory results as are obtained with rock or sand.

In order to convey a general idea of this process the methods followed by the Kingston Coal Co. will be briefly described. While these may differ in slight details from those pursued by other companies it is believed that they are typical and representative. This firm was one of the first to employ this method for surface support and has worked out many of the problems it presents.

WASTE MIXED WITH FOUR VOLUMES OF WATER

Rock obtained from the various jigs, picking tables and mechanical cleaners is passed through Jeffrey pulverizers and reduced so as to pass between screen bars ⅜ in. apart. This pulverized material is next mixed with water in the proportion of four volumes of liquid to one of solid. This mixture of water and rock is then sluiced or piped to boreholes which extend to the workings underground. These holes are 6 in. in diameter and are cased as far as the solid rock with terra-cotta pipe 1½ in. thick.

A cast-iron pipe is cemented into the borehole where it enters the underground workings. To the lower end of this pipe another length is attached by means of a bell-mouth joint. This terminates in a long-radius

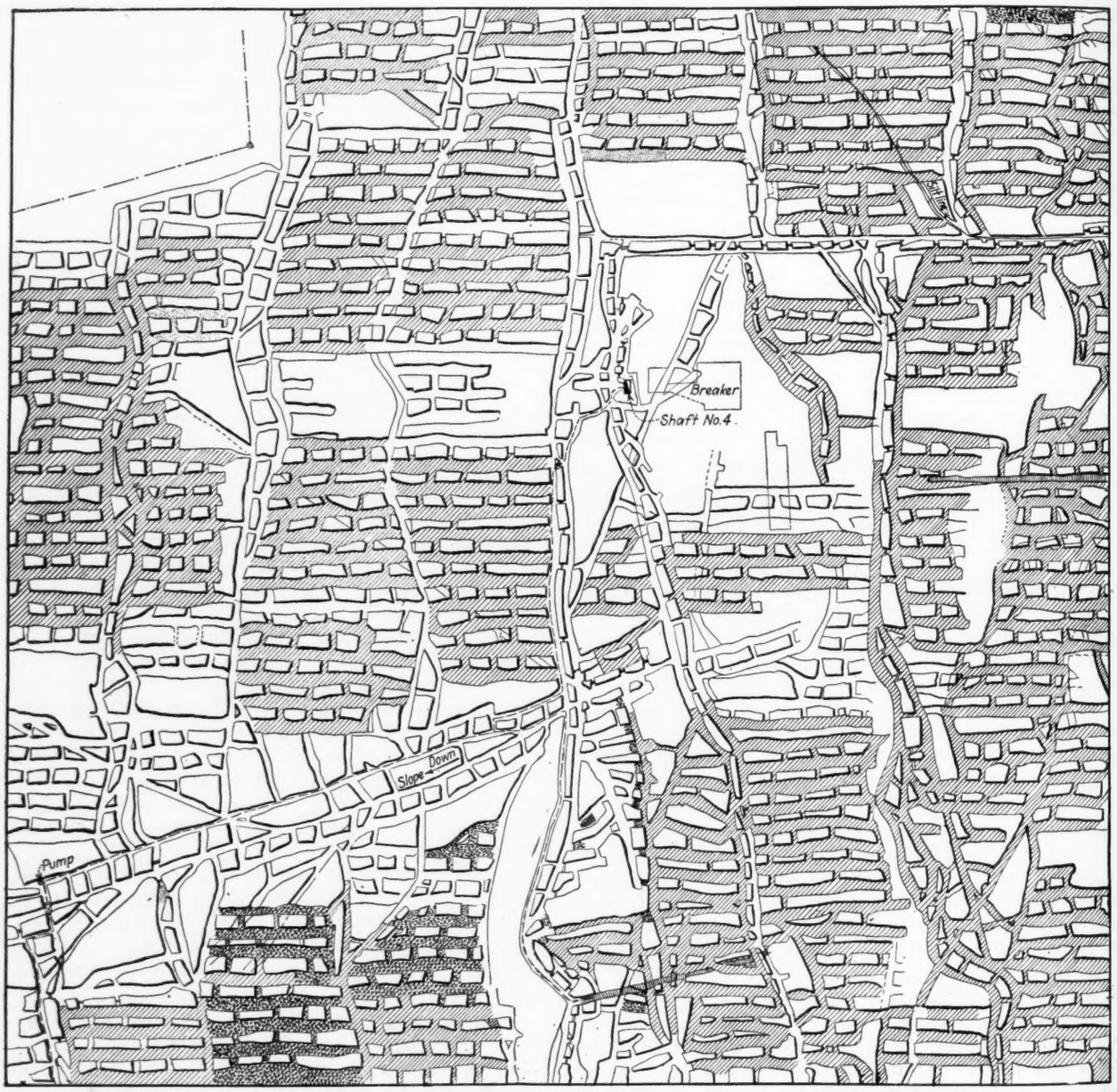
elbow connecting to the main silt line. The cast-iron pipes and fittings at this point are all of special design, as those of standard or ordinary pattern are too light to endure the wear.

Wood Wedges and Oakum Used in Pipe Joints

The main silt line is of extra heavy cast-iron pipe with bell and spigot joints. When silting was first tried the customary lead joints were made, but they were found to be expensive. Next cement was tried. This had the same drawback as lead. Moreover it rendered the joint hard to break, which was a decided disadvantage, as it was frequently necessary to take lengths apart in order to clean or shift the line. Accordingly, the joints are now made with wooden wedges. These are one inch thick and driven as close together as possible against a ring of oakum packing placed in the bottom of the bell. When silt is turned on, any openings between the wedges soon become filled with fine material which the swelling wood holds securely in place, rendering the joint watertight.

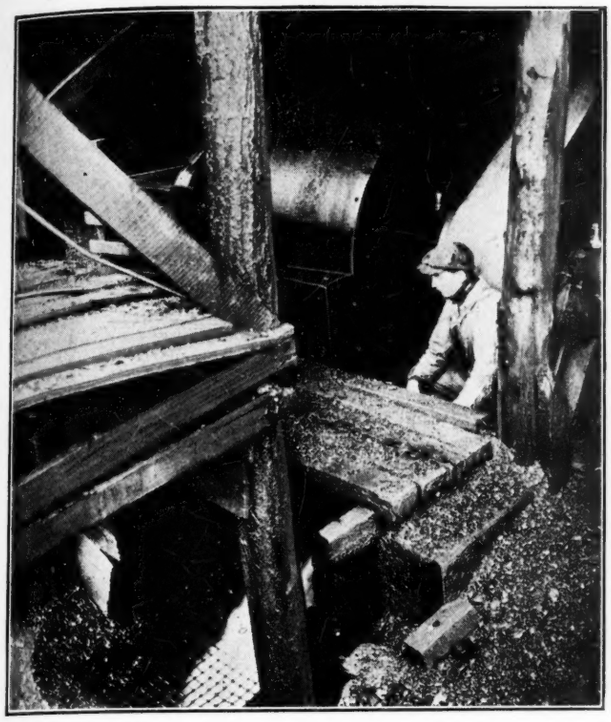
When for any reason the pipe line or borehole becomes plugged it is necessary to clean out the obstruction. If the plugging is in the silt line itself its exact location can be determined by tapping on the outside of the pipe. When located the adjacent joints in the line are broken by knocking out the wedges and the obstructing material is cleaned out by means of hoes or similar tools.

If the stoppage is in the borehole a ½-in. pipe in lengths equal to about the thickness of the coal bed are screwed together and pushed upward into the hole as far as the obstruction. Water under pressure is then turned on. This loosens and washes out the silt. In



SHOWING HOW EXTENSIVE HAS BEEN THE SILTING AT SHAFT NO. 4 OF THE KINGSTON COAL CO.

These workings are under the borough of Kingston, Pa., which, situated across the Susquehanna River from Wilkes-Barre and part of its trolley area, usually is regarded by the visiting stranger as no unimportant part of that growing city. Though the seam is over 700 ft. below the surface it is thought well to give the further protection that silting affords. The advantage of silting is that a roadway can be made through the silt without difficulty. Yet the artificial ribs thus formed will stand up almost as firmly as the coal they replace. In the map the round spots placed either on the blank spaces which represent coal extracted or on the areas covered by the hatched symbol for silting denote heavy posts which support the roof prior to the deposition of silt.



CRUSHER AT OLD SLOPE AND BOREHOLE FOR SILTING WASHERY WASTE TO MINES

All the waste from the washery is crushed to pass ⅜-in. mesh and, through pipe boreholes, is passed down into the mine with four times its volume of water. The boreholes are 6 in. in diameter and cased to solid rock with terra-cotta pipe 1½-in. thick. The screen over the hole can be seen in the foreground at the base of the illustration.

some instances the lower 400 ft. of the hole is cleaned in this manner, after which water is turned on from above and allowed to stand over night. This usually brings the desired results, but if not, the entire borehole is cleaned from the bottom, as above described.

Pipe Flushed with Water Night and Morning

Every day twenty minutes before silting is begun water is turned on and allowed to run down the borehole and through the pipe. This is repeated after the run of silt is finished at noon or evening. This washes the pipe clean and keeps it from clogging.

Strange as it may seem, the greatest abrasion on the silt line is at the top and periodically it is necessary to revolve the pipe through 90 deg., or one-quarter of a revolution, in order to equalize the wear. It is interesting to note that it is possible to cause the silt to flow uphill. In one portion of one of the Kingston Coal Co.'s mines the surface elevation of the top of the silt hole is 1,128 ft., and the elevation of the point where this borehole enters the underground workings is 591 ft. From the foot of the borehole the silt line extends for 2,500 ft. and its discharge end is at an elevation of 842 ft. Thus the point of silt efflux is 251 ft. above the bottom of the borehole.

Only small sections of the mine are silted at any one time. Suppose, for instance, that ten adjacent chambers are to be flushed. Silt batteries are placed at the lower ends of the rooms and necks leading to the gangway. If the room floors are level or nearly so box troughs or drains are laid through the center of the room. In the covers of these boxes, at intervals of about 10 ft., openings are provided which are covered by small-mesh wire screens. The silt pipe is led to the upper end of the chamber and the silt turned on.

This material flows down the room with the water and collects against the battery. Gradually it rises higher and higher, the surplus water flowing out through the drain after reaching the first mesh-protected opening. Eventually the silt fills the room completely from end to end and from floor to roof. As the water drains off this material packs solidly, so that there is but little shrinkage and the silt, particularly in places that pitch, even though the inclination be only slight, bears firmly against the roof.

In building a silt battery 12-in. timbers are set vertically and about 3 ft. apart. These are hitched into the floor and wedged against the roof. About half way from floor to roof a transverse timber is placed against the uprights. This is supported by posts from the floor and braced by timbers set in hitches cut into the roof. Usually three braces are thus placed. Two-inch hardwood planks are then fastened to the inner face of the uprights. All cracks are then stuffed with hay. This acts as a filter, allowing the water to run off but preventing escape of the silt.

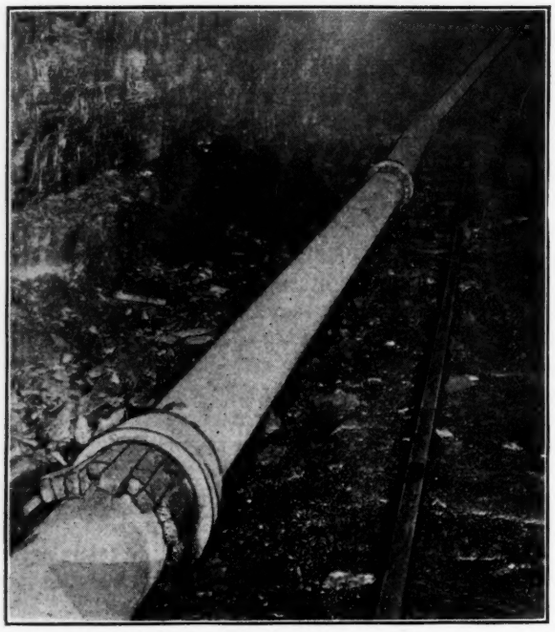
Silt Is Fed From Near One End of Room

As soon as one chamber is filled silting of the next is begun, and so on until all have been treated. Silt leaving the pipe does not flow uniformly but is emitted in gushes or pulsations that may shoot 20 to 30 ft. down the room. It is supposed that this action is the result of air in the silt column. Ordinarily not more than about one joint of pipe extends into a room being flushed. If the room is level, however, it is often necessary to allow the pipe to extend inward for a third of the room length or more.

In the Red Ash bed of the Kingston No. 4 mine

CRUSHER AT WORK IN KINGSTON NO. 4 COLLIERY

A pipe, leading into the front of the crusher, delivers the water by which the broken rock is fed to the workings. Note the fence which protects the workmen from being caught in the belt.



FLUSH PIPE OF CAST IRON WITH WOOD-WEDGE JOINTS

This shows a silt line on No. 3 Ross plane in No. 3 shaft. The pipes are of extra-heavy cast iron with bell and spigot joints. At first lead was tried, then cement, but cement joints were hard to break and lead was too expensive. Wood wedges are now used against an oakum ring. They soon swell, and whatever leaks develop are rapidly stopped by silt.

a heading has been driven crossing the silted rooms at about their midlength. In practically every case where the silt was pierced it was found to be tight against the roof. Silt thus cut stands in a vertical wall and does not run as might be expected.

In the Orchard bed of No. 1 shaft of the same colliery the pillars of the silted rooms are being robbed. The first pillar removed was that which was farthest from the shaft and accessible from the lower entry, that roadway being kept open for this purpose. The pillar, which was 36 ft. wide, was slabbed 16 ft. along one side, a roadway 8 ft. wide being made by taking up bottom. Rock thus made was built into a pack wall and gobbed.

When the end of the pillar was reached the remaining 20 ft. of width of the pillars was taken on the retreat. Cogs were built in the room every 20 ft. for roof support. Props also were set at regular intervals to protect the men while at work. The roof during robbing was under tension and consequently no matter how solid it might have appeared it was likely to scale off.

Filling Found to Be Tight Against Roof

When the pillar was removed it was found that the filling was tight against the roof. When all the coal supporting the roof had been taken out, exposing the silt pillar, small pieces of coal were found adhering to it, thus giving it the appearance of being composed largely of coal. The ordinary procedure followed in robbing was pursued in this case—that is, when the robbing of one pillar was well started, work on the next was begun.

At the present time an area about 800 ft. long and 400 ft. wide has been completely robbed, the last pound of coal having been taken out of the area. The roof is thus supported entirely by silt pillars and a few cogs placed as the coal pillar was removed. No indications appear on the surface that settlement is taking place.

Where the pillars have been removed, however, the roof has settled slightly, but nowhere to exceed 8 in. In the pillars adjacent to this completely-mined area an increased weight made itself evident by the spauling of the coal. Little powder was used in mining the pillars, as the weight alone broke the coal down. Some explosive was needed, however, in the bottom bench, as this coal is harder than that in the top of the bed.

May Finally Replace Pillars by More Silt

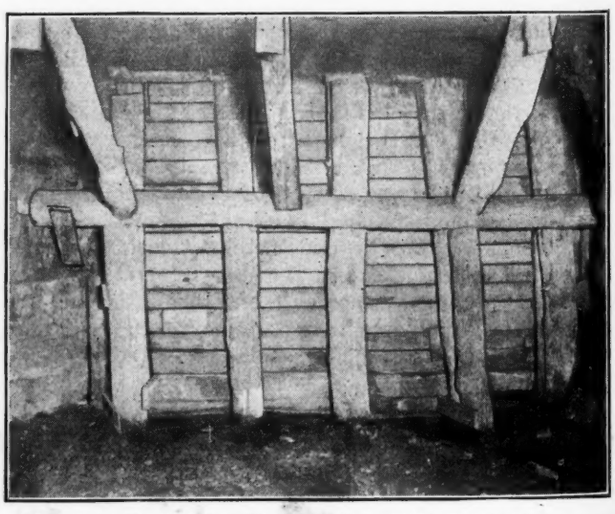
It is now possible to pass through all the workings where the coal has been entirely removed and observe how the silt filling is taking the weight formerly supported by the coal. Later on when enough silt is available it is possible that even the space formerly occupied by the coal pillars will be flushed. From present indications this hardly seems necessary, but the filling of all voids might safeguard the upper beds.

A heading is now being driven through the old workings that have been flushed. This passage cuts the old pillars diagonally and clearly shows how thoroughly the silting has been done. The partial filling of the rooms with mine rock and gob apparently materially aids the silting, as not only is less fine material required to completely fill a room but the silt fills the voids in the coarser material and if this has been piled properly it practically cements the individual pieces together, thus giving better support to the roof.

Not only is silt an excellent roof support but it may be advantageously used to stop a squeeze. If for any reason a squeeze is brought on, prompt silting of the rooms will stop it. Furthermore, by employing this method of roof support it is possible to obtain practically 100 per cent extraction of the coal in room-and-pillar workings. The only coal lost in such a case is the spillage from shovels and mine cars. This, of course, is only an exceedingly small proportion of the total bed content.

Silting Makes Possible Complete E traction

The chief objection to silting is its expense. Of course it costs money to crush rock fine enough to be used in this way and to flush it down boreholes through pipe lines and into rooms. Against this expense, how-



BATTERY TO HOLD BACK SILT FILLING

Hay is used to make the barrier tight. The crosspiece is held in place by timbers which are secured against the roof by wedges driven into holes prepared for them. A box drain with a screen on top at intervals leads away the water toward the mine pumps. The timbers in the barrier are 12 in. in diameter.

Repairing Timber

In the Red Ash Bed, No. 4 mine. It looks like a place driven, as the English would say, "in the whole." Inspection, however, shows that only on the left do the walls reflect light. The others are dull and smooth. They are of crushed slate on which light falls without reflection. These walls appear straight and solid and indeed they are as perfect as they seem.

ever, must be weighed the benefits derived. Entirely aside from all considerations of surface support with the best of ordinary mining it is extremely doubtful if better than 95 per cent extraction is obtained. By silting it is of course possible to obtain a 100 per cent or total extraction.

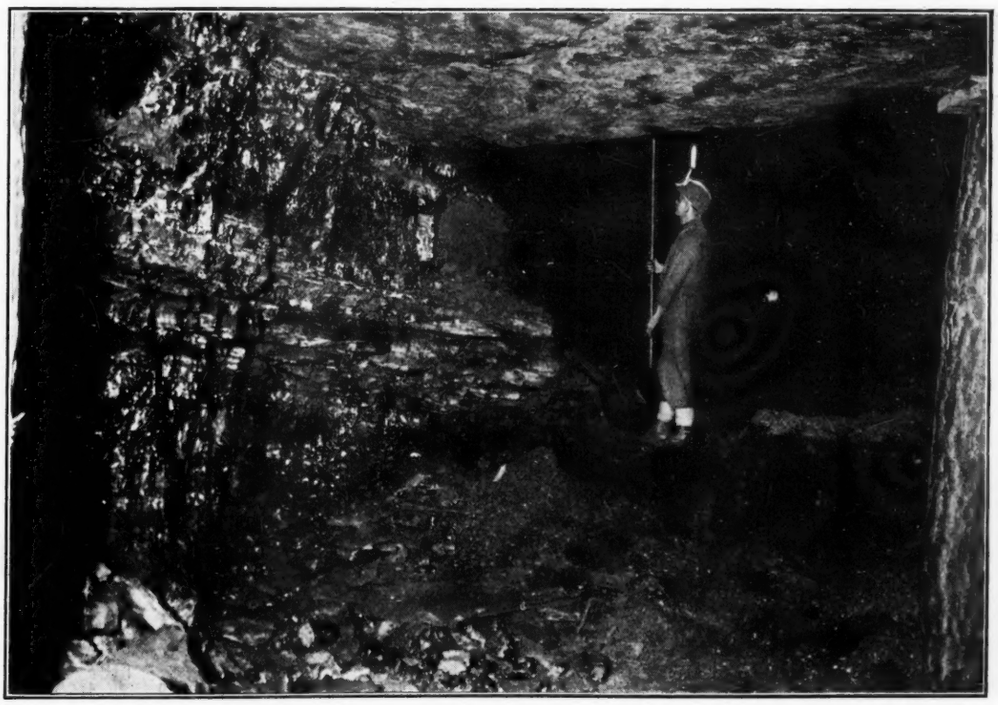
The total tonnage and life of a mine may thus be augmented at least 5 per cent by this means. This may more than counterbalance the expense entailed. Furthermore, as has been already stated, silting may be employed to prevent a squeeze. Throughout the anthracite region as well as elsewhere many hundreds of thousands of tons of coal have been irretrievably lost through squeezes. If the rooms in these mines had been silted such squeezes never would have occurred, and the coal lost could have been reclaimed.

Another and possibly the chief gain accruing to the coal company which utilizes this method of support is difficult to calculate accurately, but unquestionably it will amount to a large sum during the life of any colliery which operates in a thickly-settled region. This is the absolute protection of the surface from subsidence. The money saved by this means cannot be reckoned, but its aggregate is none the less appreciable.

PARENTS, NOT BEING DEPENDENT, COULD NOT COLLECT.—Judge Henderson, of the Superior Court of Pennsylvania, has affirmed the decision of the Court of Common Pleas of Luzerne County that Andrew and Mary Corcoran could not be regarded as dependent on their son who was killed by accident when working for the Pennsylvania Coal Co., and so were not entitled to receive compensation for his death.

Testing Roof

In Kingston No. 4 Mine. A heading is being driven through a silted area. The rear wall, which is the face of the tunnel, is of unexcavated silt. Note the layers of slate in the rib. Material like this is gobbed in rooms that have not been flushed, thus helping to supply material without which the silt would not be able to fill the large area needing support.



Conditions Under Which Bulk-Oil Concentration of Fine Coal Gives Best Results*

Ash Reduced 26 to 75 Per Cent—Sulphur Greatly Reduced in Anthracite, Little in Bituminous—Coal Should Not Be Ground Finer Than 200-Mesh—Treatment Usually Increases Softening Temperature of Ash

By G. St. Perrott† and S. P. Kinney‡

In making the tests of coal washing by the bulk-oil concentration method of the Trent Process Corporation described in the article appearing in last week's issue and entitled "By Mixing Fine Coal, Water and Oil, Grains of Oily Coal Are Formed with Elimination of Earthy Impurities" the coals used were those which are described in Table I. These coals will be referred to in the paragraphs that follow under the names given them in the column marked "Designation" in that table.

Table II gives averages of results with a number of typical coals of the United States. The coals were pulverized to 65 mesh and ground for six hours with an equal weight of water in a laboratory ball mill before treatment by the Trent process. The oil employed was in all cases a grade of navy fuel oil running 125 seconds on the Saybolt viscosimeter at 25 deg. C. The specific gravity of the oil was 0.875 (30. deg. Baumé) at 20 deg. C.

The results as set down are for the most part self-explanatory. It will be seen that ash reduction with most of the coals tested is good, varying from 30 to 75 per cent. Sulphur reduction is fairly good in the case of anthracite coals but low in the case of bituminous coals. With these latter coals just sufficient sulphur is removed to keep the sulphur content of the recovered coal about the same as that of the raw coal. Combustible recovery is with a few exceptions better than 95 per cent.

The removal of pyrite from coal by any process depending on the selective action of oils is considerably more difficult than the removal of other mineral matter, such as shale or slate. Pyrite is readily wetted by oil and, particularly when in a fine state of subdivision, tends to attach itself to the coal-oil agglomerates rather than to remain suspended in the water. It is more easily separated from anthracites than from bituminous

TABLE I. DESCRIPTION OF COALS TESTED BY TRENT PROCESS

Seam	Nature of Coal	Source	Designation
.....	Culm.....	Trent Process Corporation, Washington, ton, D. C.	Anthracite, culm I.
.....	Feed to concentrating tables..	Washery of Hudson Coal Co., Scranton, Pa.	Anthracite, culm II.
.....	.....	Rhode Island.....	Anthracite, Rhode Island.
Pittsburgh.....	Pulverized coal.	From plant of Oliver Iron and Steel Co., Pittsburgh.	Bituminous, Pittsburgh.
Upper Freeport.	Run - of - mine	Avenue Mine of Allegheny Steel Co., Brackenridge, Pa.	Bituminous, Upper Freeport I.
Upper Freeport.	Feed to washery	Mine of Inland Collieries Co., Harmarville, Pa.	Bituminous, Upper Freeport II.
Upper Freeport.	Bone-coal refuse	Washery of Inland Collieries Co., Harmarville, Pa.	Bituminous, bone-coal refuse
No. 6.....	Run-of-mine...	No. 1 mine Superior Coal Co., Gillespie, Illinois.	Bituminous Illinois I.
No. 6.....	Run-of-mine...	No. 7 Mine Big Muddy Coal & Iron Co., Herrin, Illinois.	Bituminous, Illinois II.
No. 6.....	Run-of-mine...	No. 12 Mine, Vandalia Coal Co., Sullivan, Indiana	Bituminous, Indiana.
Lehigh.....	Run-of-mine...	No. 5 Mine Folsom Morris Coal Mining Co., Lehigh, Okla.	Bituminous, Oklahoma.
.....	Run-of-mine...	Cars at mouth of mine, Wilkeson Coal & Coke Co., Wilkeson, Washington.	Bituminous, Washington.
.....	Brazil coal....	Trent Process Corporation.	Bituminous, Brazil.
Blossburg.....	Waste from washery.....	Phelps Dodge Co., Dawson, New Mexico.	Bituminous refuse, New Mexico.
Soddy.....	Washer refuse..	Durham Coal and Iron Co., Soddy, Tenn....	Bituminous refuse, Tennessee.
Black Creek....	Washer refuse..	Black Creek Coal Co., Nauvoo, Ala.	Bituminous refuse, Alabama.
.....	Run-of-mine...	Bins at head of washery plus the bone from the picking table Pacific Coast Coal Co., Issaquah, Washington	Sub-bituminous, Washington.
.....	Run-of-mine...	No. 1 Mine, Bertetti Coal Co., Lytle, Texas	Lignite, Texas
.....	Run-of-mine...	McKissick Cattle Co., Ione, Cal.....	Lignite, California.

*Second installment of an article entitled "The Use of Oil in Cleaning Coal," contained in Reports of Investigations, Bureau of Mines. The first installment appears on pages 132-134 in the issue of last week.

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TABLE II. SUMMARY OF RESULTS OF TRENT PROCESS

		Raw Coal			Cleaned Coal			Refuse				Efficiency			
Kind of Coal	Oil Used, Gal. per Ton	Ash, per Cent	Corrected Ash, per Cent	Sulphur, per Cent	Weight, per Cent	Ash, per Cent	Sulphur, per Cent	Weight, per Cent	Ash, per Cent	Corrected Ash, per Cent	Sulphur, per Cent	Ash Reduction, per Cent	Combustible Recovery, per Cent	Sulphur Reduction, per Cent	Time of Agitation, Hours
Anthracite culm I	65	27.7	30.4	1.00	74.0	7.0	0.70	26.0	87.0	95.0	1.99	74.7	97.8	30	0.5
Anthracite culm II	65	31.4	34.8	1.63	69.0	6.5	0.85	31.0	87.0	95.6	3.05	79.2	98.0	48	0.5
Anthracite, Rhode Island	75	21.7	23.8	0.85	82.0	6.7	0.83	18.0	90.7	98.3	0.95	69.2	99.5	..	2.0
Bituminous, Pittsburgh	80	12.5	14.2	1.27	92.0	6.0	1.34	8.0	88.0	95.2	0.40	52.0	99.5	..	0.1
Bituminous, Upper Freeport	80	9.3	11.2	2.28	96.5	6.7	2.34	3.5	87.6	94.8	0.60	28.0	99.7	..	2.0
Bituminous, bone coal refuse	80	21.7	23.9	0.93	88.0	12.5	0.80	12.0	88.7	96.9	2.08	42.3	99.4	14	1.0
Bituminous, Illinois	80	16.6	20.7	5.33	85.0	7.4	5.28	15.0	69.7	76.6	2.25	55.4	89.8	1	3.0
Bituminous, Indiana	80	9.9	13.0	4.38	96.4	6.3	4.27	3.6	86.2	93.5	0.80	36.4	99.8	3	0.5
Bituminous, Oklahoma	80	19.5	23.6	4.74	69.0	5.7	3.08	31.0	50.5	59.0	8.50	70.8	83.5	35	2.0
Bituminous, Washington	80	22.6	24.7	0.49	87.5	13.6	0.50	12.5	85.0	92.1	0.50	39.8	98.7	..	0.5
Bituminous refuse, New Mexico	60	54.7	59.3	0.55	45.0	22.9	0.86	55.0	80.6	87.3	0.29	58.1	82.8	..	2.0
Bituminous refuse, Tennessee	50	63.5	69.4	1.64	31.0	20.6	1.48	69.0	82.7	90.2	1.65	67.7	77.8	10	2.0
Bituminous refuse, Alabama	80	23.5	26.2	1.60	80.5	6.6	1.76	19.5	92.8	100.7	0.90	72.0	100	..	1.0
Sub-bituminous, Washington	80	19.3	21.1	0.48	87.0	10.0	0.50	13.0	80.0	86.7	0.45	48.4	97.8	..	3.0
Lignite, California (a)	80	35.1	39.3	1.77	81.5	25.7	1.56	18.5	75.9	83.2	2.30	26.8	95.0	12	2.0
Lignite, Texas (a)	80	33.5	36.9	1.44	79.7	18.1	1.42	20.3	94.2	102.4	1.25	46.0	100	1	2.0
Bituminous, Brazil	60	35.6	39.7	2.47	66.0	9.4	2.32	34.0	86.0	94.4	2.71	73.6	97.0	6	4.0

(a) Carbonized at 500 deg. C.

coals. This difference is shown clearly in the following analyses showing the percentage of total sulphur, sulphate sulphur, pyritic sulphur, and organic sulphur in a bituminous and an anthracite coal before and after treatment by the Trent process. It will be seen that in the treatment of anthracite coal, the pyritic sulphur almost disappeared from the recovered coal, whereas in treating the bituminous coal a considerable percentage of pyritic sulphur still remained in the cleaned product.

TABLE III. EFFECT OF PROCESS ON SULPHUR PRESENT

Coal	Condition	Ash	Analysis of Sulphur — Total	Pyritic	Sulphate	Organic
Bituminous, Oklahoma	Raw	19.5	4.75	3.01	0.36	1.37
	Recovered	7.9	3.75	2.10	0.15	1.50
	Refuse	46.3	6.50	4.85	0.35	1.30
Anthracite culm, II.	Raw	31.5	1.74	1.21	0.06	0.47
	Recovered	7.0	0.85	0.13	0.07	0.65
	Refuse	66.1	2.73	2.41	0.01	0.31

A study was made of artificially created, that is synthetic, mixtures of coal and pyrite for the purpose of determining definitely the percentage of pyrite which might be removed from a mixture in which the pyrite was known to be separated from the coal particles. It was found that with mixtures of bituminous coal and pyrite ground to pass a 200-mesh sieve, the sulphur could be reduced by the Trent process about 60 per cent. Practically no separation was possible when this mixture was ground to 600 mesh or finer. A more complete separation was obtained when anthracite was mixed with pyrite.

The pyrite refuse separated from the various mixtures always retained considerable quantities of oil, pointing to the fact that where the pyrite was separated in mixtures of coarser mesh this pyrite was mechanically separated from the amalgam by reason of its high density and still retained a film of oil. Coal pyrite containing about 46 per cent sulphur was used in the experiments. It was found possible to make an amalgam of the wet ground pyrite alone with very little of the pyrite remaining suspended in the water.

Results point to the desirability of preliminary water concentration of high-sulphur coals for removal of pyrite before treatment by the Trent process.

TABLE IV. SYNTHETIC MIXTURES OF COAL AND PYRITE

Coal Mixture	Mesh	Raw Coal Mixture — Ash Per Cent	Sulphur Per Cent	Recovered Coal — Weight Per Cent	Ash Per Cent	Sulphur Per Cent	Refuse — Weight Per Cent	Ash Per Cent	Sulphur Reduction, Per Cent
Upper Freeport bituminous coal 80 per cent, pyrite 20 per cent	100	17.9	9.72	91.4	12.7	5.61	8.6	65.7	42.1
	200	17.9	9.72	85.5	10.3	3.89	14.5	66.2	60.0
	600	17.9	9.72	98.8	17.2	9.47	1.2	85.5	7.6
Anthracite culm, 80 per cent, pyrite 20 per cent	100	34.5	9.9	70.4	16.0	3.4	29.6	67.7	66.3
	200	34.5	9.9	60.2	10.7	1.4	39.8	69.9	86.0
	600	38.0	10.4	57.0	9.9	2.8	43.0	77.3	72.8

Any oil or organic liquid not miscible with water may be employed in the Trent process, provided its viscosity is not too great. The heavy topped crudes may be employed if the water used in the process is heated, thus reducing the viscosity of the oil. Certain commercial emulsions, such as water-gas tar or "B. S."[1] petroleum emulsions, have been successfully employed. Here again the viscosity must not be too great. B. S. refinery settlings of the consistency of cup grease were not found to be satisfactory at ordinary temperatures. An oil of viscosity equal to 135 seconds (at 25 deg. C.) on the Saybolt viscosimeter gives satisfactory results. When oils of viscosity equal to 400 seconds and upward are employed it is necessary to use heated water if the best results are to be achieved. Using an oil with a viscosity equivalent to 4,000 seconds Saybolt at room temperature it was found necessary to heat the water to 30 deg. C. to effect formation of the amalgam.

In Table V a series of test results are given in which liquids of increasing viscosity were used to clean the same coal.

TABLE V. ANTHRACITE CULM II WITH OILS OF VARIED DENSITY

Oil used — Kind	Gallons per Ton	Viscosity at 25° C. Seconds Saybolt	Raw Coal — Ash Per Cent	Sulphur Per Cent	Recovered Coal — Weight PerCent	Ash Per Cent	Sulphur Per Cent	Refuse — Weight Per Cent	Ash Per Cent	Ash Reduction Per Cent
CS_2	150	...	31.4	1.63	61.0	5.9	0.89	39.0	71.6	81.2
C_6H_6	150	4	31.4	1.63	63.0	6.5	0.86	37.0	73.9	79.3
CCl_4	150	...	31.4	1.63	62.3	6.5	0.91	37.7	72.2	79.3
Gas Oil	80	40	31.4	1.63	62.3	6.4	0.66	37.7	73.0	79.6
Fuel oil	64	135	31.4	1.63	66.7	8.6	0.90	33.3	76.8	72.6
Cylinder oil A	64	400	31.4	1.63	69.0	10.7	0.88	31.0	78.0	66.0
Cylinder oil B*	80	4,000	31.4	1.63	74.6	14.0	1.37	25.4	82.2	55.4

*Water heated to 70 deg. C.

Apparently the efficiency of ash separating begins to diminish when an oil greater in viscosity than about 40 seconds Saybolt is employed. The loss of combustible in the refuse is somewhat less with the more viscous oils. Considerably more of the liquids of low viscosity, such as benzol and carbon tetrachloride, must be used to obtain a coherent amalgam than of the oils of higher viscosity.

In the greater part of our work, oil has been used in an amount equal to 0.3 lb. per pound of dry cleaned coal. If a coal contains 25 per cent of removable refuse, it will be necessary to use 450 lb., or about 62 gallons, of light fuel oil per ton of raw coal treated. With coal ground to pass a 200-mesh screen, this quantity of oil produces an amalgam in granules about $\frac{1}{8}$ inch in diameter. If finer ground coal is employed, it may be necessary to use as much as 0.4 lb. oil per pound of dry cleaned coal. It is best to work with as small a quantity of oil as possible because the amalgam can be washed more thoroughly when the granules are fairly small, and the resultant cleaned coal contains less ash.

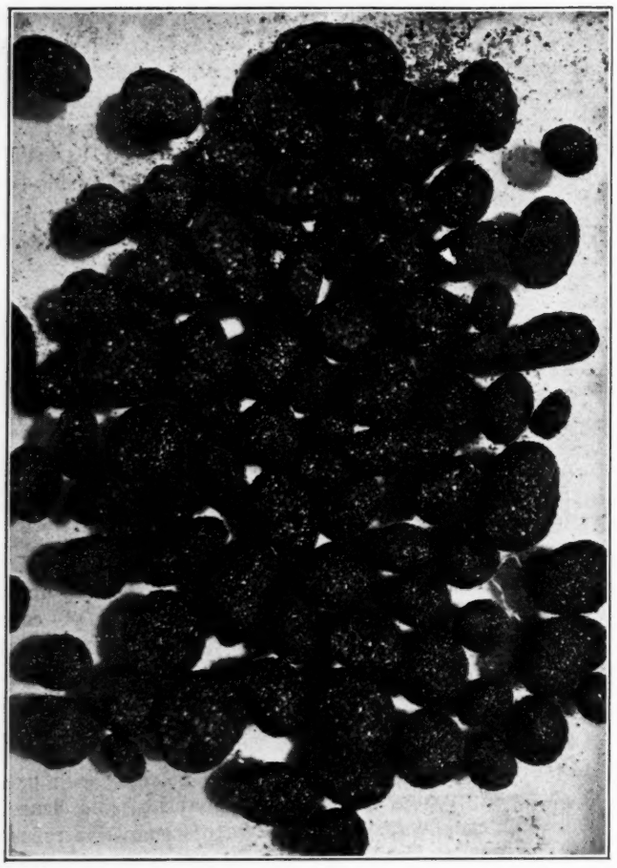
But Little Oil Is Wasted in Process

The ways in which oil possibly may be lost in the process of making the Trent amalgam are: (1) Emulsification in the water, (2) absorption in the refuse, (3) volatilization. No appreciable loss due to emulsification has been found. Apparently the presence of finely pulverized coal in the water effectively prevents emulsification. As a matter of fact, certain commercial emulsions, such as water-gas tar and B. S. emulsion, are broken down by the addition of pulverized coal and may be used as oils for the carrying out of the Trent process. Even if a little oil were retained in the water, using this water over again after separation of the refuse would eliminate loss from this source.

The oil absorbed by the refuse is seldom more than 1 per cent of the total oil used and frequently is practically zero. In certain cases where a refuse high in carbon or pyrite has been obtained, oil losses as large as 15 per cent have been noted. Volatilization losses are negligible with the heavier petroleum oils but of course quite appreciable in the case of gasoline or benzol. It is hardly likely, however, that such volatile oils will be used in any commercial application of the process.

Our results point to the conclusion that oil losses in

[1]Bottom Settlings.



GRANULES OF AMALGAM THAT FORM THEMSELVES IN THE EMULSION OF OIL AND WATER

Oil and coal collect together and form these interesting granules of amalgam which are of great purity. The pyrite content, however, is not much affected.

the first stage of the process, *i.e.*, agitation and separation of refuse, will be negligible. Recovery of oil from the amalgam by distillation is another matter and one outside the scope of the present article.

Little Water When Granules Are Large

An amalgam in granules ⅛ inch or larger usually retains 10 to 15 per cent moisture, which will not drain out of the mixture. This includes the hygroscopic moisture of the coal. In an amalgam of very fine granules the moisture content may be as high as 30 to 40 per cent. A large part of this moisture occurs as a coating of the small particles. The size of the granules depends upon the amount of oil used, the size of the coal particles, the method of agitation and time of agitation and to some extent on the character of the coal. Certain sub-bituminous coals required more oil to produce granules of any given size than do the bituminous coals or anthracite.

Brisk agitation of the kind given by rapidly-revolving paddle blades is most efficient in separating mineral matter from coal and in securing rapid formation of the amalgam. At the beginning of our work, oil, coal and water were shaken in a stoppered bottle on a shaking machine. This method of agitation was first employed because it gave conditions of agitation which could be duplicated for a series of tests and permitted of quantitative treatment of materials. It was soon found, however, that better ash reduction was obtained by agitation in a small glass churn with paddle blade revolving at 1,000 r.p.m. and that certain coals which did not form an amalgam when shaken in the bottle were readily worked in the churn. A comparison of values with churn and shaker for a typical coal follows:

TABLE VI. OF ANTHRACITE CULM NO. I CONCENTRATION WITH CHURN AND WITH SHAKER

			Recovered Coal—Ash		Recovered Coal—Sulphur		Refuse—Ash		Ash Reduction	
Mesh	Raw Coal Ash Per Cent	Sulphur Per Cent	Churn Per Cent	Shaker Per Cent	Churn Per Cent	Shaker Per Cent	Churn Per Cent	Shaker Per Cent	Churn Per Cent	Shaker Per Cent
65	27.7	1.00	12.8	18.5	0.81	0.81	78	75	53.8	33.2
200	27.7	1.00	9.0	11.8	0.78	0.79	82	80	67.5	57.4
600	27.7	1.00	6.5	10.0	0.66	0.67	87	89	76.5	63.9

Coals differ much in the rapidity with which they form the so-called amalgam. As a general rule it may be stated that coals containing more than 3 or 4 per cent of hygroscopic moisture as received will be difficult to work. When they contain 20 or 30 per cent moisture, as do the lignites, separation is practically impossible even with prolonged agitation.

It has not been found possible to get good separation of carbonaceous material from mineral by treatment of the raw lignite. Lignites are readily wetted by water, and once this occurs, either by wet grinding or by soaking, the water is not readily displaced by oil. On agitation of a wet ground mixture of lignite with oil there is some tendency for separation into layers of coal-oil and refuse-water, but no formation of the compact agglomerate of coal and oil which takes place with bituminous coals or anthracites. Microscopic examination of the mixture shows globules of oil suspended in the mixture of lignite and water, indicating a high surface tension between the oil and the coal-water mixture.

Inspection of Table I will show that the two samples of lignite were carbonized at 500 deg. C. before treatment. Mere drying of the coal at 110 deg. C. is not sufficient. The structure of the coal is not changed by treatment at the lower temperature and the water so driven off is reabsorbed when, prior to the Trent process, the coal is soaked in water. It is necessary to carbonize the lignite at a temperature so high that it will change its structure and render it no longer hygroscopic. When this is done and the carbonized material finely pulverized by grinding in the ball mill, the formation of the amalgam takes place readily, although a large ash reduction is not obtained with the brown woody lignites. The mineral matter in these lignites apparently is finely disseminated throughout the coal substances and complete separation is not attained even though the material is pulverized as fine as a ball mill can provide—that is, to about 5 microns (0.005 mm.).

In considering the efficiency of the Trent process in the cleaning of a given coal, we must then consider a third factor—time of agitation—in addition to ash reduction and combustible recovery. This factor—time of agitation—assumes importance in treating sub-bituminous coals and lignites. Obviously, overhead expenses will become greater as the time of agitation increases and there will be a length of agitation beyond which it will not be profitable to go. In Table VII are set down analyses of a number of coals and the time it was found necessary to agitate them when treating them by the Trent process. Two figures for time of agitation are given, the first column being the time the mixture was agitated before a separation into small agglomerates of coal and oil were visible. At this time the granules are soft and cannot be separated from

TABLE VIII. RELATION BETWEEN FINENESS OF GRINDING AND ASH REDUCTION.

	Mesh	Average Size of Particles	Anthracite Culm I	Anthracite Culm II	Upper Freeport I	Upper Freeport II	Upper Freeport Bone Coal Refuse	Illinois I	Oklahoma	Indiana	Bituminous, Washington	Sub-Bituminous, Washington
		Microns	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Ash in raw coal	...	....	27.7	31.4	9.3	9.5	21.7	16.6	19.5	9.9	22.6	19.3
Ash in recovered coal	65	130	12.8	13.7	7.9	9.5	17.2	7.6	5.8	9.0	17.1	12.6
	200	35	8.0	6.0	7.4	9.4	13.1	5.6	5.7	9.0	16.0	11.7
	600	10	6.0	5.0	6.7	7.5	12.0	7.4	4.3	6.3	13.6	10.0
Ash in refuse	65	130	78.0	70.0	84.0	....	....	65.1	57.7	....	70.0	62.9
	200	35	82.0	72.0	84.0	....	80.0	55.7	50.5	....	77.0	70.0
	600	10	88.0	88.0	87.6	86.0	88.0	69.7	30.0	86.2	85.0	80.0
Sulphur in raw coal	...	....	1.0	1.6	2.3	0.9	0.9	5.3	4.7	4.4	0.5	0.5
Sulphur in recovered coal	65	130	0.8	1.6	1.9	0.9	0.9	4.3	3.5	4.1	0.5	0.5
	200	35	0.8	0.9	2.1	0.8	1.0	3.7	3.1	4.1	0.5	0.5
	600	10	0.7	0.9	2.3	0.9	0.8	5.3	2.6	4.3	0.5	0.5
Per cent ash reduction	65	130	53.7	56.4	15.1	0.0	20.7	54.2	70.3	14.2	24.4	34.7
	200	35	71.1	81.0	20.4	1.1	39.6	66.2	70.7	9.1	29.2	39.4
	600	10	78.3	84.1	28.0	21.0	44.6	54.4	77.9	36.4	39.8	48.1

the refuse by screening. After a further period of agitation the granules become larger and more coherent, and by screening, may be filtered from the refuse and water. The figures in the second column show the total time taken for agitation and screening of the amalgam and for the several agitations in fresh water for removal of the last traces of refuse.

TABLE VII. TIME REQUIRED FOR TREATMENT

	Time of Agitation		Analysis				
Name of Coal	First Separation, Minutes	Completion, Minutes	H_2O	Vol. Matter	Fixed Carbon	Ash	Sulphur
Bituminous, Pittsburgh	½	10	1.53	33.42	52.72	12.33	1.25
Bituminous, Upper Freeport I	2	30	1.50	34.40	54.92	9.18	2.25
Bituminous, Illinois II	2	30	2.50	31.87	52.42	9.93	1.28
Bituminous, Illinois I	30	180	10.93	36.22	40.30	12.55	4.03
Bituminous, Oklahoma	5	120	5.10	35.80	41.40	17.70	4.46
Bituminous, Indiana	1	30	1.75	42.75	45.80	9.70	4.19
Lignite, Texas	60	..	26.68	31.97	26.55	14.80	1.41
Lignite, Texas, (Carbonized)	20	120	0.05	10.95	55.50	33.50	1.44
Lignite, California	60	...	15.20	48.31	21.29	15.20	1.60
Lignite, Calif. (Carbonized)	30	120	0.05	19.05	45.80	35.10	1.77
Anthracite culm I	2	30	2.15	7.27	64.87	27.70	1.00

The Trent process is unique among coal-cleaning methods in that it treats coal in a very finely pulverized condition. Hence any advantages which are obtained by treatment of finely pulverized coal are advantages peculiar to the process. In the course of the investigation much work has been done to determine the relation between fineness of grinding, ash removal and combustible recovery or, in other words, to show to what degree of fineness it is necessary to grind different coals in order to secure optimum separation of mineral matter from combustible matter.

Table VIII summarizes the results of Trent process treatment of a number of coals at different meshes. A subsequent paper will discuss the subject of fineness of grinding at some length and will consider methods of determining the average size of coal particles in samples pulverized finer than 300-mesh. It is evident from the data as presented in the table that grinding finer than 200 mesh does not give ash reduction sufficient to pay for the increased cost of the finer pulverization. With finer grinding the percentage of combustible matter in the refuse decreases perhaps not in sufficient quantity to warrant the added expense of grinding from 200 mesh to 600 mesh or finer. Sulphur reduction is in general at a maximum with the 200-mesh material.

A number of comparative determinations of the fusibility of ash in raw and cleaned coal were made. Where any considerable amount of ash has been removed, the ash from the cleaned coal shows either a slightly higher softening temperature or larger softening interval. This was not true in the case of the bituminous coal from Oklahoma. Results are given in Table IX.

This paper has presented the results of laboratory-scale tests as to the efficiency of the Trent process in cleaning coal. A noteworthy feature of the operation of the process is the cleanness of separation of mineral matter from combustible matter. Combustible recovery has averaged better than 95 per cent. High-ash reduction has been obtained with the bituminous coals and anthracites. Sulphur reduction has been good in the case of anthracites but poor with the bituminous coals. It has not been found feasible to treat the lignites without preliminary carbonization, because of the difficulty of forming a coherent agglomerate of the raw lignite and oil. Finer pulverization than 200 mesh does not give a sufficient increase in ash reduction with most coals to warrant the added expense of the longer period of grinding. Any oil the viscosity of which is not too great may be employed in the process. Oil losses in the refuse or water are apparently negligible.

TABLE IX. FUSION TEMPERATURE OF ASH IN RAW AND CLEANED COAL

Coal	Raw or Cleaned	Softening Temperature Deg. F.	Fusion: Temperature of Ash Softening Interval, Deg. F.	Fusion: Temperature of Ash Flowing Interval, Deg. F.	Analysis: Volatile Matter, Per Cent	Analysis: Fixed Carbon, Per Cent	Analysis: Ash, Per Cent	Analysis: Sulphur, Per Cent
Anthracite culm I	Raw	2280	220	50	7.43	64.87	27.70	1.00
	Cleaned	2620	360	70	19.10	73.20	7.70	0.72
Anthracite culm II	Raw	2390	110	100	7.83	60.81	31.36	1.63
	Cleaned	2680	50	50	12.40	78.72	8.88	0.98
Bituminous, Upper Freeport II	Raw	2510	130	230	34.50	56.03	9.47	0.85
	Cleaned	2510	390	120	32.21	60.25	7.54	0.85
Bituminous, bone coal refuse	Raw	2510	230	120	30.12	48.14	21.74	0.93
	Cleaned	2740	460	140	32.92	54.84	12.24	0.80
Bituminous, Pittsburgh	Raw	2340	140	110	34.14	53.29	12.57	2.34
	Cleaned	2340	300	50	34.81	59.00	6.19	1.69
Bituminous, Pittsburgh	Raw	2310	30	170	33.94	53.54	12.52	1.27
	Cleaned	2280	200	210	34.29	59.85	5.86	1.19
Bituminous, Indiana	Raw	2110	130	140	43.51	46.62	9.87	4.26
	Cleaned	2280	340	40	44.30	49.41	6.29	4.27
Bituminous, Oklahoma	Raw	2040	200	120	37.72	43.63	18.65	4.70
	Cleaned	2060	80	270	32.47	53.76	8.77	3.83
Bituminous, Washington	Raw	2510	120	70	30.54	42.55	26.91	0.61
	Cleaned	+2730	+90	...	36.71	50.82	12.47	0.99
Sub-bituminous, Washingtou	Raw	+2680	...	...	39.13	41.53	19.34	0.48
	Cleaned	+2730	+90	...	43.33	42.99	13.68	0.59

Elements of Design for Anchor Bolts of Machines—III

Bolts for Prospective Installations—Improvised Flush Bolt Anchor—How to Tighten Locknuts so That They Will Not Rattle Loose—Raising a Foundation to a Higher Level—Drawings and Schedules for Specifying Anchor Bolts

BY TERRELL CROFT
St. Louis, Mo.

IT HAS sometimes been found desirable during the erection of a structure to arrange for the installation at some future time of foundation anchor bolts for a light machine. A frequent additional requirement is that nothing in the meantime may extend above the surface of the masonry or foundation top.

If ordinary unpocketed anchor bolts are set in such a foundation, their ends must project above its surface and may be the cause of accidents or delays, the first arising from persons tripping on them, and the second from the fact that if machinery is to be installed it must be raised before it can be skidded to place. Furthermore, the projecting ends of such bolts are frequently bent if the machinery is not installed promptly. Their threads may become battered also, rendering them useless. Unless pockets are provided at the lower ends of the bolts, their replacement is extremely difficult and expensive.

Flush bolts may be advantageously used in such cases. Fig. 15 shows on the left such an anchor in perspective and on the right the anchor installed in a foundation. This device, which is used for light machines, is merely a casting with an extended base and a threaded hole in its center. Such anchors are placed in the concrete of the foundation during construction, and at any future time the machine can be clamped to them by inserting the necessary bolts. As shown at Fig. 15 on the right, some of the anchors on the market are drilled and threaded to accommodate bolts of several sizes, so that one size of anchor can be used for bolts of two or three different diameters.

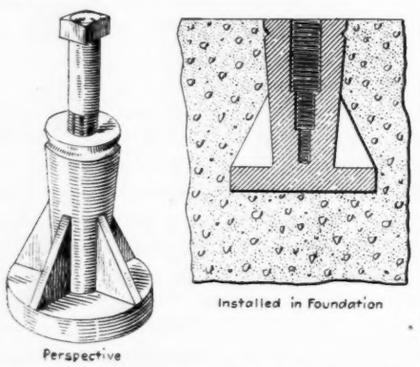


FIG. 15. CAST-METAL BOLT ANCHOR
This lies flush with the top of the foundation when installed and, being made with three separate threaded diameters, is adapted to bolts of as many different sizes.

The anchor shown in Fig. 16 is used for foundations subject to greater vibration. This device can be procured on the market to accommodate bolts of diameters up to 2 in. It consists of three parts, the top casting, the cylindrical casing and the bottom casting. The cylindrical casing is merely a piece of wrought-iron pipe or similar material so that the complete anchor can be made as short or as long as is necessary to satisfy existing conditions. This anchor is assembled and set in the concrete with a bolt temporarily screwed into it to hold the various parts together until after the concrete is poured. After the concrete sets, the bolt can be removed and the open hole at the top of the anchor plugged up with a stud until the time arrives when the machine for which the bolt hole was provided is to be installed.

A home-made flush anchor can be arranged as shown in Fig. 18. This device consists of an ordinary machine bolt provided with an anchor plate screwed into a sleeve coupling. This coupling can be made of machine steel and should have a length of at least four diameters of the bolt upon which it is used. In setting in the concrete, the bolt carrying the anchor plate is screwed midway up into the coupling. This leaves the threaded upper half of the coupling ready for the accommodation of a stud bolt or cap screw when the machine is installed.

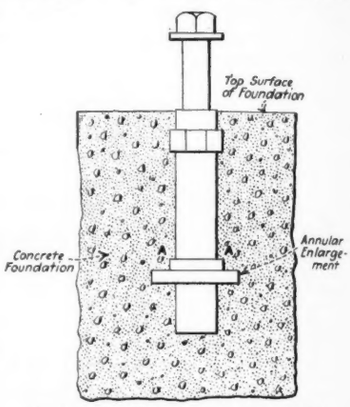


FIG. 16. MOORING ANCHOR FOR CONCRETE
The flange *AA* serves to knit bolt and foundation together.

Lag screws are sometimes used for holding machinery in place. Wooden cleats, as shown in Fig. 19, are provided, in which such screws may be driven. Though this method may hold steady-running machines satisfactorily, it cannot be depended upon if the device is subject to appreciable vibration. Vibration will soon loosen a lag screw and render the attachment of the machine insecure. In constructing concrete floors, where it is impossible to predetermine where anchor bolts will in future be needed, strips of wood of a wedge-shaped section are inserted in the concrete during construction, as shown in Fig. 19. These strips are so placed that it probably will be possible to attach a machine to them by the aid of lag screws, no matter where the machine to be installed must be bolted. The holding power of lag screws of various sizes is shown in Table IV. These values apply to bolts recently installed and one could not expect such results for bolts that had been in the wood for a long time, particularly if the machine that they carried was subject to vibration.

Nuts used upon anchor bolts may be either square or

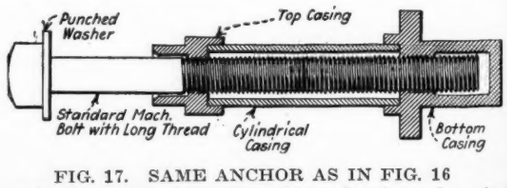


FIG. 17. SAME ANCHOR AS IN FIG. 16
This being in section shows how the anchor is made out of two castings and a piece of pipe casing.

*Previous articles appeared in issue of July 14, pp. 45-51, and in issue of July 21, pp. 95-99.

TABLE IV. HOLDING POWER OF LAG SCREWS.

(These data are from tests made at the University of Iowa by A. J. Cox in the year 1891)

Kind of Wood	Diameter or Size of Screw, Inches	Diameter Hole Bored, Inches	Length of Screw in Wood, Inches	Maximum Resistance, Pounds	No. of Tests Made
Seasoned white oak....	⅜	⅜	4½	8,037	3
Seasoned white oak....	⅜	⅜	3	6,480	1
Seasoned white oak....	½	½	4½	8,780	2
Yellow pine.....	½	½	4	3,405	2
Unseasoned white cedar	½	½	4	3,405	2

hexagonal. The dimensions of both types have been thoroughly standardized in the United States; hence no more will be said about them here. It is the practice to use square nuts at the lower ends of anchor bolts, particularly if the nut is to be retained in the cavity of a recessed anchor plate. The reason for this is that a square nut, because of its longer edge, cannot turn readily in a properly proportioned cavity in an anchor plate, whereas a hexagonal nut might so turn if the casting were even slightly distorted.

On the other hand, the nut at the top of an anchor bolt bearing against the machine bedplate should, as a rule, be hexagonal, for two reasons. The first is that the hexagonal nut is neater in appearance, the second that such a nut is more "get-at-able." Six possible positions exist in which a wrench can be made to engage a hexagonal nut, whereas with a square nut there are only four. This consideration may be of special importance in locations where space is restricted. In installations where appearance is a factor, polished nuts may be employed. Where they will be manipulated frequently they should be case hardened.

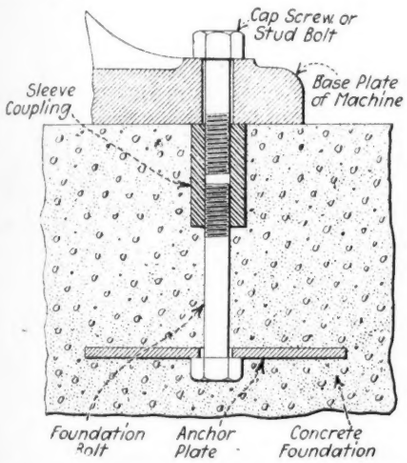


FIG. 18. SLEEVE COUPLING PROVIDES PLACE FOR BOLT

This is a good method when seeking a way to make it possible to place another machine on the same bedplate without drilling holes into the foundation.

Lock washers are sometimes applied (as shown in Fig. 20) between nuts and machinery bedplates. They are used in cases where the machine is subject to vibration that would soon "rattle" off a nut unless the washer were inserted. A locknut can be employed in place of a spring washer, but the time required for manipulating a second nut must in some cases be considered where it is necessary to remove a machine and replace it with another in a minimum length of time. This feature must frequently be considered in various industrial installations. The ends of the lock washer (shown in Fig. 21) normally flare out. It is made of spring steel, so that when the nut is turned down upon it it presses the two ends until they lie in the same plane as shown in Fig. 20. The washer then acts like a compressed spiral spring and presses constantly against the bedplate and the nut, thus preventing the latter from working loose.

Locknuts (Figs. 22, 23 and 24) should be used on practically all foundation anchor bolts unless a spring washer similar to that shown in Fig. 20 is applied. Now if a locknut is to be provided, the usual procedure is to turn the first nut down as tightly as possible and then to apply the locknut, screwing it down still harder. It appears to be the belief that this increased pressure will always lock the nut. This inference is incorrect, however, because the increased pressure tends to force the upper face of the thread of the lower nut away from the lower face of the bolt thread. This may transfer the holding stress from the primary nut to the locknut. The illustration at Fig. 24 shows this condition in exaggerated form. It is evident from this that where the locknut is put on as just decribed, the stress may be wholly borne by the lower face of the bolt thread and the upper face of the locknut thread, and the threads of the lower nut will not have any stress upon them. In other words, the lower nut in this case is merely a washer.

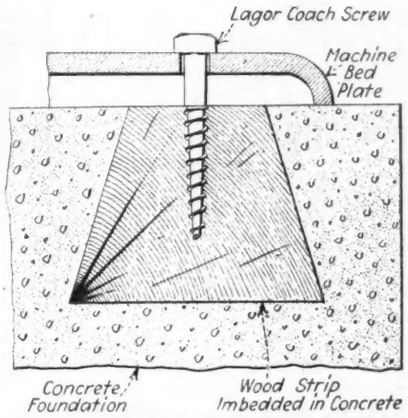
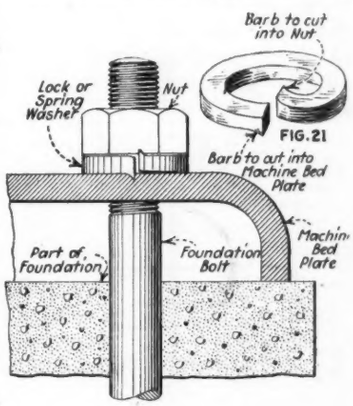


FIG. 19. LIGHT MACHINERY SECURED BY LAG SCREWS

If it is anticipated that it will be desirable later to place light machinery without it being known in advance exactly where the machinery is to go, wood strips can be embedded in the concrete for the reception of lag screws.

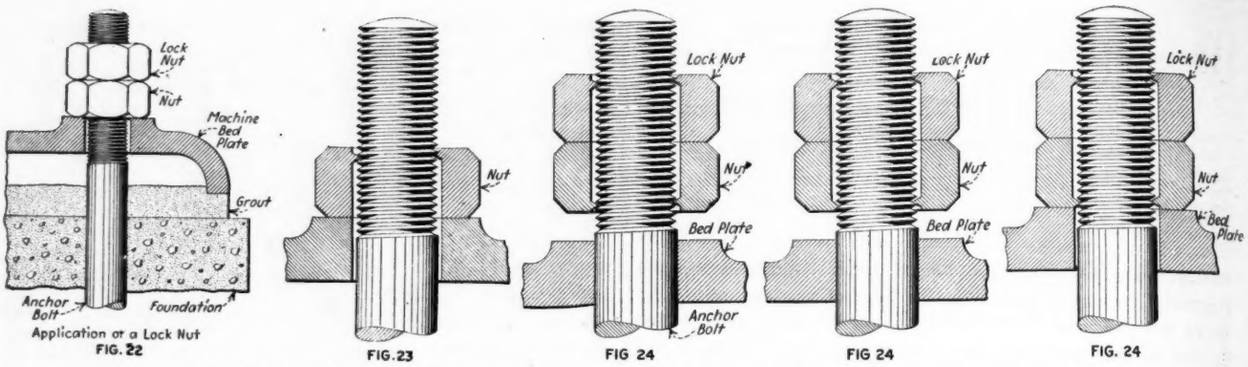
The correct method of putting on a locknut is shown in the two right-hand Figs. 24. With this method the conditions indicated in the figure on the left are corrected by causing the nut to perform its proper function and by making the locknut hold the primary nut effectively in place.

For a correct application the nut should be set to place as follows: Turn the lower nut down on its bolt until its lower face lies slightly above the upper surface of the bedplate, next apply the locknut until (as shown in center Fig. 24) its lower face rests firmly against the upper face of the first nut. Then turn down the first nut and the locknut together until the first nut rests quite tightly (right Fig. 24) against the surface to be held. The locknut now may be given another half turn, more or less, whereby its effectiveness will be increased somewhat. Why the method just outlined is the proper one to follow is obvious. When the locknut is turned down against the lower nut (shown in center Fig. 24), the lower faces of the threads of the primary



FIGS. 20 AND 21. SPRING WASHER

A cut and warped washer with barbs at the two ends. The barbs cut into the nut and bedplate, the nut being screwed tight against the pressure of the spring washer.



FIGS. 22, 23 AND 24. ILLUSTRATING THE BEST WAY OF SECURING LOCKNUTS SO THAT THEY WILL NOT RATTLE OFF

Fig. 23 shows nut as it should be and is, when used alone. Only one thread is shown on the nut. When used with a locknut it should not be screwed down tight to the bedplate. Fig. 24 shows what happens when the locknut is added. Here on the left the locknut is pushing the thread of lower nut from the thread of the bolt. When the locknut finally is tightened by an extra half turn it thrusts the lower nut downward so that the threads of that nut bear downward on the top of the threads of the bolt. The reaction between the two nuts keeps them from turning. Extreme wrench pressure is not necessary.

nut bear on the upper faces of the bolt threads. This relation between nut and bolt threads is due to the pressure imparted by the locknut. The pressure of the lower nut reacts against that due to the locknut and the upper faces of the locknut threads bear on the lower faces of the bolt threads. The reaction between the locknut and the primary nut serves, as it were, to bind the two. This binding effect is preserved if the lower nut and the locknut are turned down together on the bolt until the lower face of the lower nut rests tightly upon the bedplate surface. Additional tightening of the locknut will, because of the elasticity of iron, increase this binding effect.

Extending the anchor bolts of an old foundation involves a certain amount of reconstruction. Such extensions ordinarily can be made, however. Figs. 25 and 26, detailing a typical case, indicate the usual procedure. Fig. 25 shows, in dashed lines, an old foundation, the full lines indicating the new foundation. The

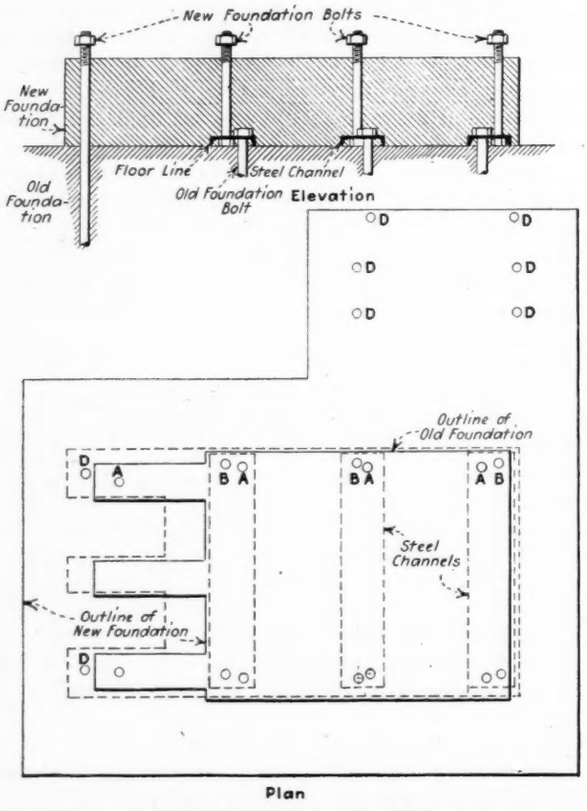


FIG. 25. METHOD OF RAISING FOUNDATION

Steel channels are placed across foundation, and the nuts of the old bolts bear on them. Bolt holes are drilled in the channels, and new bolts are passed through these to the proposed level of the bedplate of the machine.

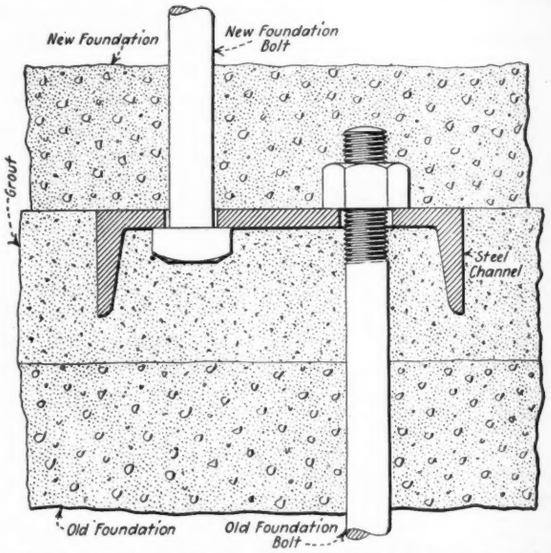


FIG. 26. DETAIL OF CHANNEL IRON OF FIG. 25

The bolts while not in line are near enough to make the hold secure. The channel is stiff enough to prevent distortion, and the resistance of the foundation in itself makes any such a twist improbable.

letter *A* shows the positions of the old anchor bolts, while *B* and *D* indicate the new positions. The new foundation, as shown in elevation, extends only a relatively short distance above the floor line. This distance was insufficient to accommodate anchor bolts for the new machine of such lengths that they would provide the requisite resistance to withdrawal, hence it was decided, in so far as possible, to tie the new bolts to the old ones, thus making them act in conjunction. The old machine bedplate rested on a level with the floor; hence the old anchor bolts (*A*) projected about 3 in. above the floor line.

Over the projecting ends of each pair of old bolts a length of properly-drilled channel was placed as shown at Fig. 26, and the new bolts were inserted through holes in these channels. The channels and bolt heads were then grouted securely in place as indicated. Next the new concrete foundation was cast around the new bolts, a templet being provided to hold their upper ends in correct position. The bolts (*D*) came outside

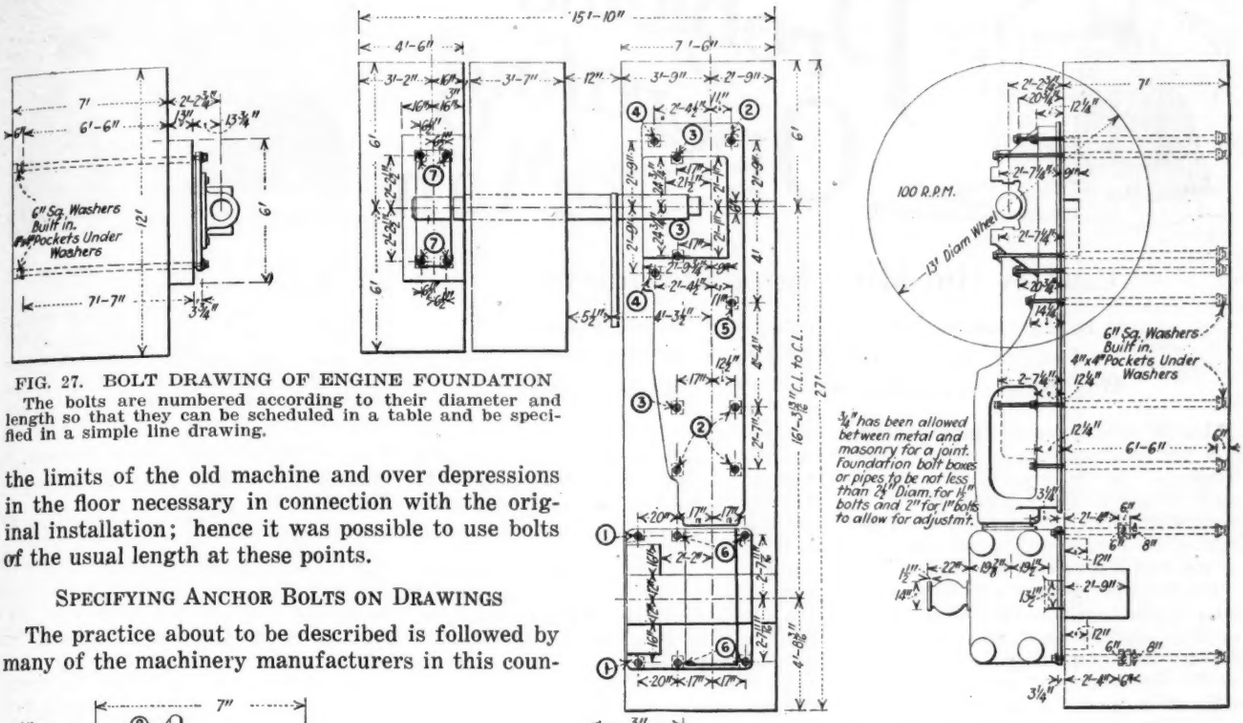


FIG. 27. BOLT DRAWING OF ENGINE FOUNDATION

The bolts are numbered according to their diameter and length so that they can be scheduled in a table and be specified in a simple line drawing.

the limits of the old machine and over depressions in the floor necessary in connection with the original installation; hence it was possible to use bolts of the usual length at these points.

Specifying Anchor Bolts on Drawings

The practice about to be described is followed by many of the machinery manufacturers in this country in specifying anchor bolts on drawings. Before the bolts can be specified it is desirable to prepare a scale drawing of the machine or prime mover on its foundation, as shown in Fig. 27. An effort should be made to so lay out the foundation that the fewest possible number of sizes of anchor bolts will be necessary. That is, the ideal anchor-bolt specification would be one that called for all bolts to be of the same diameter and length. It is seldom feasible to so lay out a large foundation that such simplicity can be realized, but an effort should be made in that direction.

The anchor bolts should be numbered on the foundation drawing as shown in Fig. 27. For example, all of the bolts of one length and diameter should be numbered 1; all those of another length and diameter, 2; and so on. This being done, a combination drawing (Fig. 28) should be laid out as part of the foundation drawing tracing. This shows dimensions of all of the anchor bolts required. It should show in addition the nuts, washers and anchor plates, and in fact should indicate the complete anchor-bolt equipment.

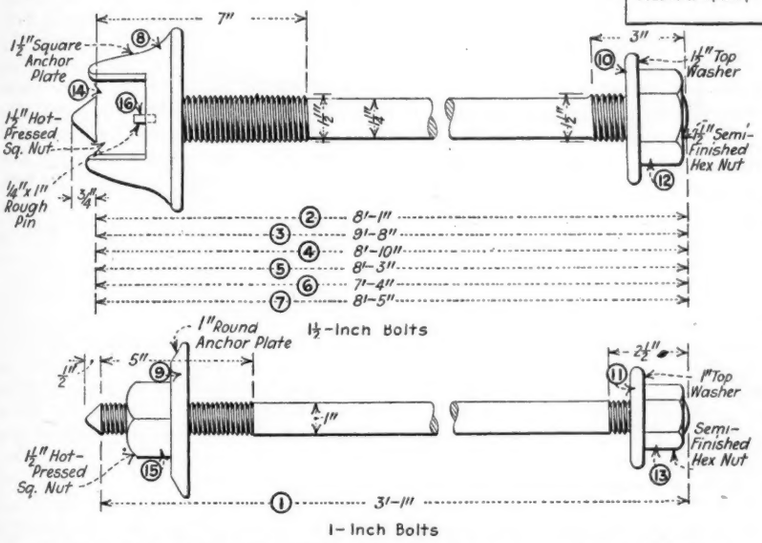


FIG. 28. DRAWING SHOWING VARIETIES OF BOLTS, ETC., NEEDED

Each bolt length has a different number, as has also each kind of washer, nut or pin. When the time comes to erect the machine it is more than humiliating and annoying to find that one or more of the bolts needed is absent.

This drawing (Fig. 28) next should be reduced to a schedule like that of Fig. 29, which any clerk or man not familiar with mechanical drawings can readily decipher and understand. This schedule will indicate exactly how many pieces of each size of nuts, bolts, washers, anchors, etc., are required.

It may appear that the schedule of Fig. 29 is a duplication of the drawing Fig. 28. This is true in a way, but on the other hand the schedule summarizes all of the information relative to material required for anchor bolts, which summation cannot be ascertained from the drawing itself without the expenditure of an appreciable amount of time. It is apparent from a study of Figs. 27, 28 and 29 that each of the reference numbers, 1, 2, 3, etc., refers in each of the three instances to one specific part.

ITEM	No. WANTED	SIZE AND NAME	MAT.	PAT. No.	DWG. No.	STOCK STD.	STOCK OTHER
1	2	1" x 3'-1" Foundation Bolt				2316	
2	4	1 1/2" x 8'-1" " "				2331	
3	3	1 1/2" x 9'-9" " "	W.I.				
4	2	1 1/2" x 8'-10" " "	"				
5	1	1 1/2" x 9'-3" " "				2336	
6	4	1 1/2" x 7'-4" " "				2327	
7	4	1 1/2" x 8'-5" " "				2338	
8	18	1 1/2" Bottom Washer Square				2276	
9	2	1" " " Round	C.I.-D	SE 7565	127-169		
10	18	1 1/2" Top " "				162	
11	2	1" " " "	S.S.C.		127-17		
12	18	1 1/2" S.F. Hex Nut				377	
13	2	1" " " "				373	
14	18	1 1/2" H.P. Square Nut				413	
15	2	1" " " "				410	
16	18	1/4" x 1" Rough Pin	ST.I.				

FIG. 29. COMPLETED BOLT, WASHER, NUT AND PIN SCHEDULE

With a record like this it is easy to check whether the right bolts are provided.

Problems of Operating Men

Edited by James T. Beard

Certify the Mine Superintendent

It Is Manifestly Unfair to a Certified Mine Foreman To Require Him to Obey Orders of an Uncertified Mine Superintendent Contrary to His Own Judgment

ALLOW me to say a word regarding the qualifications of mine superintendents. At the present time nothing more seems to be required of that official than that he possess a good education, be honest and know something of the business of coal mining.

On the other hand, the mine foreman, who is hired and discharged at the will of the superintendent, must hold a certificate of competency before he can serve any length of time in the position of foreman of a mine. In nine cases out of ten the certified mine foreman hired by the superintendent will be far superior to his boss in his knowledge of practical coal mining.

The mining laws of Tennessee (Sec. 18) provide that any person who shall act as mine foreman, assistant mine foreman or gas boss for a period of more than thirty days without having a certificate of competency shall be fined $100 and costs and imprisoned not less than sixty days at the discretion of the court.

Unfair Feature of Mining Law Regarding Certification

No one can deny that it is highly unfair to require the certification of mine foremen, assistant foremen and firebosses (gas bosses) and, then, place them subject to the orders and under the control of uncertified mine superintendents.

Because of a superintendent's lack of knowledge in respect to mining matters underground, which is often the case, his orders to the foreman may be right or wrong. The law, however, makes no distinction and gives the foreman no right to follow his own judgment, but requires him to obey the directions of his superior officer.

In my opinion, every mine superintendent should hold a certificate of competency obtained in the same manner as prescribed for foremen, assistant foremen and firebosses. This would only be a fair and safe proposition. A mine foreman would not then be handicapped, as he often is at the present time by having to serve under a superintendent who has little or no practical knowledge of underground work.

It has been my experience that, as long as everything is running smoothly in the mine, the tonnage gaining and the cost growing less each day, the superintendent gets all the credit. On the other hand, if things go wrong the tonnage drops and the cost creeps higher, the blame is sure to rest on the foreman.

Were the truth known, however, it would be seen that where unfavorable conditions exist in a mine the work of the foreman is made harder than ever, and he should be credited for the efforts he must then put forth to overcome these difficulties. It is when conditions are thus unfavorable that an experienced superintendent will be able to co-operate with his foremen in securing the best possible results.

Crawford, Tenn. OSCAR H. JONES.

Firebosses as State Officials

An efficient fireboss will perform his work with the same thoroughness whether acting for a company or the state. Mine examiners needed to look after the men during working hours.

SOME time ago I raised a question, in the columns of *Coal Age*, in regard to clothing the fireboss with state authority. The same question was discussed later at the February meeting of the Rocky Mountain Coal Mining Institute, held in Denver.

The general opinion there expressed seem to be that any fireboss who would fail to perform his work thoroughly and report the condition of the mine, without fear or favor when working for a company, could not be considered a safe man if in the employ of the state. In any case, the work of a fireboss must comply with the requirements of the law, and his duties are clearly explained in Section 73 of the Coal Mining Laws of Colorado.

When Responsibility Ceases

My claim has always been that a fireboss' responsibility ceases when he has finished his examination of the mine in the morning and made a true report of its condition to the foreman, after writing out the same in the book kept for that purpose.

Although the law does require (Sec. 76) that a second examination shall be made by the mine foreman, assistant foreman or fireboss, during working hours, when the men are at work in their places, this does not mean that the fireboss shall return into the mine for that purpose, after completing his examination in the morning.

In my opinion, it would be far better to appoint safety examiners to go about the mine and examine each working place while the men are at work. These men should be in the mine the entire shift to see that each man performs his work safely and keep a careful watch over the ventilation to see that no unsafe conditions arise.

If I understand correctly, the idea of making the fireboss a state official is that he would then act independently of the foreman and the company, and would not live and act in fear of displeasing them and possibly losing his job when he felt obliged to report conditions in the mine as unsafe for work.

Let me state that I have been a fireboss myself and have never felt the force of this argument. On the other hand, in every instance both the foreman in charge and the company officials have co-operated with me in making the mine safe and removing any dangers that existed in the workings. It is my belief, therefore, that there is no need of changing the status of our firebosses.

In the framing of the Colorado Mining Laws care has been taken to safeguard the work of firebossing by providing (Sec. 79) for the suspension and prosecution of any fireboss found to have neglected his duty or made a false report regarding conditions in the mine.

The law has further recognized the value of the fireboss by providing (Sec. 80) that, in emergency, a regularly employed fireboss can act as assistant foreman. To my mind, there is nothing to be gained by going further and making him a state official.

Farr, Col. ROBRET A. MARSHALL.

Co-operation Among Mine Officials

Active, hearty co-operation essential to success. The mine superintendent being the recognized head is responsible for what he permits being done.

IN THE discussion in *Coal Age*, relative to the duties and responsibilities of mine officials, there appears to be a conflict in the attitude of foremen toward their superintendents. Some writers seem to think that the average mine superintendent is not capable to manage affairs in the mine. Reference has been made to his duties not being sufficiently defined in our state mining laws.

As has been remarked, doubtless many mine superintendents have numerous shortcomings. Since I obtained my

mine-foreman's certificate in 1893, I have served under seven different mine superintendents. My experience is that, with one exception, these have all been men of ability and common sense.

At one time I filled the office of superintendent myself, but gave it up feeling that I was not fitted for the work, which was not in my line. Though having myself many shortcomings success has attended my efforts to a larger degree when serving as mine foreman than when attempting the larger duties and responsibilities of mine superintendent.

True it is, the mine foreman has many troubles. He needs all the assistance and co-operation that can be given him. As foreman, I would always take my troubles directly to the superintendent, and found much help in conferring with him in every situation.

Some foremen much prefer to manage affairs underground in their own way and resent any interference on the part of the superintendent, whom they would rather see stay out of the mine. In my opinion, this is a wrong attitude for a foreman to assume. The presence of the superintendent in the mine should be welcomed at every turn. His relation to the work would then be helpful.

Responsibility Rests Finally on the Mine Superintendent

Frequently, a mine foreman will think that because his duties are laid down by law, giving him direct charge of operations in the mine, the superintendent should not interfere. He forgets that the superintendent is also bound by law to oversee all the acts of the foreman in charge and subscribe to the same by signing his reports, which makes him the lawful head and responsible for what he permits.

The mine operator naturally holds the superintendent responsible for whatever is done in and around the mines. He is the logical agent of the operator. He must sign for the payroll, authorize all expenditures and endorse all bills for supplies and material. How is it possible for him to do this properly if he is not thoroughly informed of everything done even if the mine is subject to his control?

In closing, let me urge that there should be established at all mines a system of consultation whereby the superintendent would confer personally with each worker in charge of a separate branch of the work. This would include talking frankly with the foreman, assistant foremen, firebosses, motormen, machine runners, timbermen and trackmen, personally, as occasion may offer.

In addition to these personal talks, the superintendent should hold weekly or bi-weekly meetings with his men for the sake of a general conference on all matters pertaining to the work. In this way, true business would take the place of false reports, and sincere co-operation would be effected to the great advantage of the undertaking.

Gans, Pa. R. W. Lightburn.

Certification of Mine Officials

Certifying to the competency of mine officials, by examination before a state board, viewed from the coal operators' viewpoint. Casting reflections on the work of examination and the value of the certificate.

FROM time to time, I have read with deep interest the articles that have appeared in *Coal Age*, bearing on the change that was made in the Bituminous Mining Law of Pennsylvania, permitting mine owners to employ uncertified men who, in their judgment, were qualified to fill the positions of mine foreman, assistant foreman, and fireboss.

Any one well acquainted with the coal-mining industry, who may chance to have read some of these articles, would be led to believe that coal-mining companies, as a rule, have little if any interest in safeguarding the lives of their men and properties.

After reading some of the statements made by writers one would think that much legislation is necessary to compel operators to employ men who are competent to fill the positions named. They urge the repeal of this clause in the state mining law, which they believe has greatly increased the hazards of coal mining.

From the general trend of the articles mentioned, I imagine many of these writers believe that the mere matter of going before an examining board and answering a few simple questions, which any one could learn with little application, endows the individual so examined and certified with certain superior powers and faculties not possessed by persons less fortunate.

Is Certification Harmful?

During an experience of over 20 years covering every coal field on this continent, I have come into intimate contact with many mine officials both certified and uncertified. My conviction is that the granting of certificates to a large number of men, certifying to their competency to fill the positions named, has the effect of doing more harm than good. This conclusion is based on many observed facts in connection with the attitude of a certain type of men toward their responsibilities both before and after certification.

Let me say, here, that to many men who have not had the opportunity of early education an examination on the principles and practice of coal mining is a very trying ordeal. I have known many men who would make splendid mine officials, having the personality, character, experience and mental equipment fitting them for these positions. Notwithstanding the possession of these qualities, however, they hold back from taking the examination through a fear that they lack the necessary education that would enable them to pass the test required.

On the other hand, I have seen many blustering, self-assertive men, who were in nowise qualified by nature for any position of trust or responsibility. Invariably, these men believe that, by brushing up on the rudiments of mining and passing the examination, they will be amply fitted to fill any position. In their estimation all mining knowledge is centered in themselves.

My observation leads me to state that it is this latter class of men who usually find fault with their superintendents and delude themselves into the belief that they could fill the same position with far better success. Perhaps the superintendent is a college man, or an engineer who has spent years in acquiring a knowledge of coal mining that renders him capable of handling the larger problems in methods of working and economic administration.

Men Holding Certificates Often Boastful and Envious

If the said superintendent, however, does not happen to possess a certificate, which he could readily get if he so desired, our friend at once concludes that his superior officer has no knowledge of coal mining, holding his position as superintendent only through favor.

The type of man just described goes through life deploring his lot and never has a good word for any man higher up in the organization. He is constantly boasting that he could do much better if given the chance which, of course, never comes to him, as his capabilities are well known by the management, who long have had his number.

Such a man has no conception of the duties and responsibilities that rest on a mine superintendent, nor the many trials and difficulties that that official must overcome. In his estimate, the entire weight and success of the enterprise rests on his own shoulders and he is the man who deserves the credit for what is done.

Some of the correspondents have even maintained that uncertified men are more careless and reckless than men who hold certificates of competency. But my observation convinces me that the opposite of this is true. The knowledge of having passed an examination seems to give most men a very exalted idea of their capability and they make the great mistake of believing themselves infallible.

Equally Qualified But Uncertified Men More Conservative

On the other hand, the uncertified man, though his knowledge of mining matters may be amply sufficient to insure the successful operation of a mine, is not generally so egotistical as the man holding a certificate. The former is more apt to carefully consider the many difficult problems confronting him before coming to a final decision on any of them.

In studying this question of certified and uncertified men, I have examined the papers of practically all the states requiring the examination of candidates for the positions of mine foreman, assistant foreman and fireboss. I consider the average mining examination to be perfunctory and of no great value in determining the fitness of applicants for these positions.

The usual procedure of men who desire to fit themselves for examination is to study up, for a time, previous to going before the board. In nine cases out of ten, the candidate who has passed the examination and received his certificate ceases to study, the incentive for which has gone. As a result, it is not long before the man has forgotten practically all that he had learned.

In this discussion, some writers have maintained that the average coal operator is not a competent judge of the qualifications of the men he employs, unless the operator himself has taken the examination and is a certified man.

FOUNTAIN HEAD OF MINING KNOWLEDGE

That is as much as to say that the fountain head of all mining knowledge is in the examining board; and the man who has not qualified under that board does not possess the necessary knowledge to fit him for holding a responsible position in the operation of a mine.

I presume it would follow that a certified man is one possessed of this necessary knowledge. Who, may I ask, is more competent to judge of the qualifications of employees, or who can be more interested in their ability to make good, than the mine manager whose personal success depends on the successful operation of the mine in his charge?

It is only reasonable to assume that the qualifications of the men an operator employs are carefully weighed before they are given any responsible position, inasmuch as the safety of both the mine and the men depend on the capabilities of the one placed in charge.

Mining men agree, of course, that all mine managers and superintendents should be experienced in every detail of coal-mining work. They must be thoroughly versed in safe and economical mining methods. As mining of coal is essentially an engineering proposition, it is my belief that mine superintendents should possess an engineering education and be capable of handling the work from an engineering point of view.

Knowledge of engineering is necessary to insure care and precision in the laying out of workings underground, and the adoption of suitable methods of mining, haulage, drainage and ventilation. Moreover, only by this means is it possible to insure the adoption of all necessary safety precautions.

In regard to compelling mine superintendents to pass the examination and hold a certificate of competency, allow me to say that any man who is at all qualified to act as mine superintendent would have no difficulty in passing this test with a high rating. Of course, it is true that some mine officials are chosen to fill the office of superintendent of mines through favoritism; but these instances are comparatively rare and the general run of these mine officials throughout the country are men who are competent, conscientious and efficient. Most of their shortcomings only exist in the imagination of others.

Indiana, Pa. W. A. G.

Remedy for Roof Troubles

Roof trouble is mostly due to maintaining too large territories standing open. Inducing heavy falls of roof, the remedy.

SPEAKING of the best method of overcoming roof troubles, C. McManiman advises working smaller areas and using every means possible to induce good falls of roof when drawing back the pillars. His remarks, *Coal Age*, June 30, p. 1163, appeal to me as striking the keynote of the situation.

Not infrequently when inspecting mine workings the place appears as though the territory had been gutted. For one reason and another much of the coal has not been taken out. At times, timbers are to be seen standing back in the waste and preventing the fall of roof that would otherwise occur.

As a result of these conditions, the roof pressure is carried over onto the pillars that remain, crushing the coal and making it more difficult and dangerous to mine. It goes without saying that the remedy lies, as has been stated, in taking out the coal completely and removing all standing timber.

MAY BE NECESSARY TO CAUSE A FALL

If it happens that the roof rock is hard and does not break readily it may be necessary to place shots in the roof to break the rock and cause a fall that will relieve the pressure on the pillars. In no case, must a large area be left standing open as it is a menace to safety in more ways than one.

When working under conditions where the roof fails to break readily, the plan I usually adopt is to reduce the width of the rooms from 24 ft. to 18 ft., or from 21 to 15, and increase the room centers a like amount, thereby increasing the width of the pillars and giving greater support to the roof in the first working.

At the same time, I would push the work rapidly forward in those sections where the pillars are smaller and there is greater danger of a creep being started. It has been my custom, at the end of the week when the mine is to be idle over Sunday, to give attention to measures that will induce heavy roof falls in areas that are standing open. Generally, Monday morning will show good results and the fireboss will report conditions most improved.

AVOIDING CREEP OR SQUEEZE

This plan may well be adopted in mines where there are large standing areas, and continued until the gutted area is entirely abolished and the roof pressure under control. In my experience, it is this practice that has avoided creep or squeeze in many instances.

Roof troubles, however, are not confined to a weak and tender shale or slate overlying the coal. One cause of trouble is gas existing in the roof, which will sometimes cause the slate to fall to a height of 16 or 18 ft. above the floor. Such a condition is dangerous at times, particularly if the ventilation should be suddenly cut off. The inrush of gas following a fall of roof may create an extremely dangerous condition if the fall occurs inside of the last breakthrough in a room or heading. Holes must then be placed in the roof at intervals to drain off the gas.

Gans, Pa. R. W. LIGHTBURN.

Inquiries Of General Interest

Wrong Principle Applied

The Center of Gravity of a Plane Figure Only Corresponds to Its Center of Mass When the Figure Is Symmetrical with Respect to Any Axial Line Drawn Through That Center

STUDYING over the question of finding the depth of water in an airway having the form of a trapezoid, when the airway is half-full, which has been solved in two different ways in *Coal Age*, Apr. 15, p. 676, and June 23, p. 1125, it has occurred to me that a third solution could be found by calculating the distance of the center of gravity of the cross-section of the airway above the floor.

Following the method of making this calculation for a trapezoid having a height h, the width of the bottom being m and that at the top n (*Coal Miners' Pocketbook*, p. 155), and making h = 6 ft., m = 9 ft., n = 6 ft., I find for the height of the center of gravity above the floor:

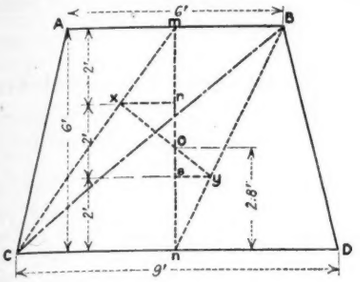
$$\frac{h}{3}\left(\frac{m+2n}{m+n}\right)=\frac{6}{3}\left(\frac{9+2\times 6}{9+6}\right)=2.8\ ft.$$

This result, however, does not agree with the previous answers, which gave for the depth of the water 2.7 ft. Allow me to ask: Is it wrong to assume that the center of gravity of this figure is at the surface of the water when the airway is half-full? If the principle is correct, why do the results not agree; or have I calculated the center of gravity above the floor correctly?

Pikeville, Ky. STUDENT.

The correspondent has applied a wrong principle in the solution of this problem. The cross-section of the airway being a plain figure (trapezoid), the center of mass, so to speak, will be at the surface of the water when the airway is half-full. But this is not the center of gravity of the figure.

The center of gravity corresponds to the center of mass of a plain figure only when the figure is symmetrical with respect to any axial line of the figure, which is not true of the trapezoid. It would be true of a square or a circle.



The center of gravity of this trapezoid is rightly figured and is 2.8 ft. above the base of the figure. It can be found graphically as illustrated in the accompanying figure. For example, divide the trapezoid *ABCD* into two triangles by the line *BC;* also bisect the figure vertically by the line *mn* and draw the lines *Cm* and *Bn*.

Now, the center of gravity of the triangle *ABC* is at *x*, *mx* being one-third of *Cm*. Likewise, the center of gravity of the triangle *BCD* is at *y*, *ny* being one-third of *Bn*.

Finally, the center of gravity of the trapezoid lies on the line *xy*; and applying the principle of moments, the areas of the two triangles having the same altitude are as 6:9, which gives the proportions

$$yO : xO :: 6 : 9$$
$$yO : xy :: 6 : 15$$
$$\text{and } yO = 6/15\ xy = 2/5\ xy$$

But, mx being $1/3\ Cm$, $mr = 1/3\ mn$; and, likewise $ns = 1/3\ mn$. Therefore, $rs = 1/3\ mn = 1/3\ (6) = 2$ ft. Also, since $Oy = 2/5\ xy$, $Os = 2/5\ rs = 2/5 \times 1/3\ mn = 2/15\ mn$; and lastly $On = (2/15 + 1/3)\ mn = 7/15\ mn$; or, in this case, $On = 7/15 \times 6 = 2.8$ ft.

Examination Questions Answered

Examination, Foremen and Assistant Foremen, Fifteenth Anthracite District

(*Hazleton, Pa., April* 19, 20, 1921).

QUESTION—*How many tons of coal are there under a tract of land containing 50 acres, the seam being 8 ft. thick and lying comparatively flat, assuming that a cubic yard of coal will weigh a ton?*

ANSWER—There being 43,560 sq.ft. in an acre, the cubic contents of an 8-ft. seam of coal, underlying 50 acres and comparatively flat, is $(50 \times 43{,}560 \times 8) \div 27 = 645{,}333$ cu.yd., which is also the estimated tonnage of coal underlying this tract, assuming a cubic yard of coal weighs a ton.

QUESTION—*State how the several mine gases may be detected. In what proportion in the air are they fatal to life?*

ANSWER — Methane or marsh gas (CH_4) may be detected in the mine by observing the effect this gas produces on the flame of a safety lamp. The first effect is to produce a faintly visible non-luminous cap surmounting the lamp flame, which should first be drawn down to a mere glimmer. The height of the flame cap increases with the percentage of gas present, up to about 3 or 3½ per cent, when the flame becomes unsteady, assuming a wavelike motion and filling the gauze chimney of the lamp. This gas contains no available oxygen and the mixture with air becomes fatal when the oxygen content is reduced to 10 per cent. The mixture then contains 52.2 per cent of methane, the air being otherwise normal.

Carbon monoxide (CO) is best detected by observing its effect on small caged animals, such as birds and mice, which are prostrated in much quicker time than the same effect is produced on the human system. One-tenth of one per cent of this gas present in the air is fatal to life if breathed for any length of time. Slightly greater percentages of the gas are instantly fatal when breathed.

Carbon dioxide (CO_2) is detected by the dim burning of lamps and its effect on the human system, causing headache, nausea and pains in the back and limbs, according to the percentage of gas present in the air. About 18 per cent of this gas, when mixed with the air breathed, produces a fatal effect on the human system, the air being otherwise normal.

Hydrogen sulphide (H_2S) is detected by its smell, which resembles that of rotten eggs. This gas is extremely poisonous, deranging the system, very small percentages becoming fatal when breathed for any length of time.

QUESTION—*What gases enter into the composition of firedamp and in what proportion?*

ANSWER—The American definition of firedamp is any inflammable or explosive mixture of methane (marsh gas) with air. In this meaning of the term, the gases forming firedamp are the oxygen and nitrogen of the air and methane. The lower inflammable limit of methane mixed with air occurs when the proportion of gas to air is 1:40, the mixture then containing 2.5 per cent of the gas. The higher inflammable limit occurs when the proportion of gas to air is 1:2.4, the mixture then containing 29.5 per cent of the gas.

QUESTION — *In what part of the workings of a mine is the greatest pressure required for the removal of firedamp or marsh gas?*

ANSWER—When the gas has accumulated at the face of a steep pitch, or in rise workings, or above the fall in pillar workings, a stronger pressure is required to cause the ventilating current to sweep away the gas. The gas being lighter than air has a tendency to hang at the face of a steep pitch or in rise workings and is often removed with difficulty.

QUESTION — *Would you consider it safe to work, in a mine giving off a considerable quantity of marsh gas, by the use of an electric lamp only? Give reasons in full.*

ANSWER — With proper care, in the use of an electric cap lamp, an experienced miner will find no difficulty in working in places generating marsh gas, provided the place is sufficiently ventilated to prevent the depletion of the oxygen of the mine air to such an extent as to affect breathing and other noxious gases are not present. However, in the use of the electric cap lamp, in a mine generating a considerable quantity of marsh gas, it is always well to have at hand a safety lamp of an approved type, as a means of indicating the gaseous condition of the air and the possible presence of blackdamp.

QUESTION — *Describe the various methods of prospecting and boring for coal, that in your opinion will give the most accurate information.*

ANSWER—The prospecting of a tract of coal land requires a thorough knowledge of the geological formations in that locality in order to derive the best results. With this information at hand boring for the coal is commenced and several holes being uniformly distributed over the tract. The only reliable method of boring for coal is that by means of the core drill. The depth of the several holes must be determined by the knowledge of the coal measures in the locality prospected. The depths of the holes in connection with the elevations of the surface at each hole will determine the inclination of the seam, while the cores taken out will reveal the nature of the strata and the fitness of the coal seams penetrated and show also the quality of the coal.

A. I. M. E. Will Have Sixteen Coal Papers

AFTER much work in committee the American Institute of Mining and Metallurgical Engineers has completed its extremely interesting program. It will meet Monday, Sept. 12, at Irem Temple, Wilkes-Barre, Pa., the morning being devoted to registration and the afternoon to a discussion of five coal papers, W. J. Richards, president of the Philadelphia & Reading Coal & Iron Co., presiding.

The papers being prepared are "Anthracite Preparation," by D. C. Ashmead, anthracite editor of *Coal Age*, giving a history of the development of anthracite treatment, an account of the rolls, mechanical pickers, spirals, jigs, specific-gravity flotation devices, tables, etc., used in the preparation of anthracite and an account of several representative breakers. By the courtesy of all the operators using devices of an unusual description Mr. Ashmead will be able to present many tables showing their efficiency in the cleaning of coal. He also will present some data regarding the use of water and the personnel employed in breaker operation.

H. D. Kynor will read a paper on the "Mechanical Mining of Anthracite" and Donald Markle in his paper on "Anthracoal" will give an account of the coking of mixtures of anthracite and bituminous coal. "The Slush Problem" will be treated by John Griffen, of the Dorr Co., and "The Ashley Planes" will be described by H. Stein.

H. N. Eavenson to Describe "The Lynch Plant"

In the evening, C. F. Huber, president of the Lehigh & Wilkes-Barre Coal Co., presiding, Howard N. Eavenson, consulting engineer, of Pittsburgh, and former chief engineer of the United States Coal & Coke Co., will describe "The Lynch Plant" in Kentucky, with an output of 8,000 tons a day and a daily capacity of 10,000 tons. The tipple has many innovations, all the coal being handled on belts and the sizing being performed on grizzlies with revolving bars. E. W. Parker, director of the Anthracite Bureau of Information and former coal statistician of the U. S. Geological Survey, will give "A General Description of the Anthracite Field" with maps and sections. Concurrently the Metal Section, with S. T. Nicholson presiding, will present two papers.

The next day an automobile trip will be made through the Wyoming Valley, visiting breakers and mine plants. The International Correspondence Schools, of Scranton, will be the host at noon and in the auditorium of these interesting schools, W. W. Inglis, president of the Glen Alden Coal Co., presiding, Douglas Bunting, general superintendent, Lehigh Valley Coal Co., will discuss "Mine Fires." This will be followed by the following papers: "Comparison of Cost of Operation of Steam versus Electric Hoists," by W. A. Thomas, assistant chief, Oxide West Department, New Jersey Zinc Co., Palmerton, Pa.; "The Determination of the Proper Electrical Equipment for the Electric Hoist," by Graham Bright, engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; "The Automatic Substation for Mines," by R. J. Wensley, and "Application of Pulverized Coal to Boilers," by J. M. Fuller. The party will return on the Laurel Line.

With R. M. Catlin, mining engineer, New Jersey Zinc Co., presiding, the evening will be given over to a technical session, the papers to be presented being "The Hoisting Plant of the Pittsburgh Terminal Railroad & Coal Co.—Cloverdale Mine," by M. D. Kirk, chief engineer of that company; "Power Installation at Cloverdale," by C. M. Means, consulting engineer, of Pittsburgh, Pa., and "The Sinking of the Butte Superior Shaft," by James Bruce, manager, Davis-Daly Copper Co., Butte, Mont.

On Wednesday a session in mine accounting with R. V. Norris, consulting engineer, presiding, a paper will be presented by J. B. Dilworth, mining engineer, of Philadelphia, Pa., on "Capitalization and Valuation of Mine Development." This will be followed by a discussion. At noon the guests will be entertained at lunch by the Wyoming Valley Shovel Works. The afternoon program will include "Queen Mine—Hearth Roaster," by J. Moore Samuel; "Flotation of Pyrite," by W. S. Morley; "Relation of Gypsum Supplies to Milling," by D. H. Newland. This session will have Rufus J. Foster, chairman, executive committee, International Correspondence Schools, as chairman.

The Society of Economic Geologists will have a joint session both morning and afternoon of Wednesday and in the afternoon session there will be two papers for coal men: "Stratigraphy of the Anthracite Region," by James P. Kemp, with discussion, and "Geology of the Namma Coal Field," by Edel Moldenke. In the evening Irem Temple will be the scene of the annual dinner and ball of the institute.

On Thursday the institute will take an all-day excursion by automobile, with lunch en route, followed by adjournment, but the courtesy of the anthracite operators will not end with Thursday. Any who wish to visit points not provided for in the program will be enabled to do so on Friday by making their desires known to the committee.

Anthracite Miners Want More Pay Next Year

EXETER Local, No. 1084, submitted to the convention held in District No. 1 a wage-revision proposal for the approval of the district executive board and of the Tri-district convention of the anthracite region. It demands: A 40-per cent increase in wages and a seven-hour day, payment to consideration miners of $8 per shift and to their laborers $7; carpenters' wage to be 85c. per hour; foremen's, 95c.; car repairers', 80c.; shop foremen's, 85c.; payment of 20c. per foot for laying wood or iron road; time and one-half for all overtime and double time for Sundays and holidays; granting of the checkoff and of the closed shop including complete recognition by the operators of the United Mine Workers of America; payment for coal on the basis of 2,240 lb. to the ton; payment of $15 for opening chambers, gangways or airways and of $2 for each prop set.

When these demands were presented several delegates declared that the scale proposed was in conflict with a resolution previously adopted by the convention calling for a wage increase of 60 per cent and the six-hour day.

D. T. & I. Makes 20 Per Cent Cut in Freight Rates on Coal and Coke

HENRY FORD'S railroad, the Detroit, Toledo & Ironton, filed new rate schedules Wednesday, July 27, with the Interstate Commerce Commission proposing drastic cuts in freight rates effective Aug. 29 on heavy traffic, including anthracite and bituminous coal and coke moving from the Ohio River to Detroit and other points.

The new tariffs provide for a 20 per cent reduction on grain and grain products, coke, and anthracite coal moving from Temperance, where it is taken from other lines to points in Michigan and on soft coal on a distance scale basis.

The Detroit, Toledo & Ironton R.R., which runs from Detroit, on Lake Erie, to Ironton, on the Ohio River, crosses or has connections with such roads as the Pennsylvania, New York Central, Michigan Central, Baltimore & Ohio, Canadian Pacific and other large systems.

Central Pennsylvania Operators Seek Wage Reduction; Again Ask Conference

IN SESSION at Altoona, Pa., on July 28, the Central Pennsylvania Coal Producers' Association addressed a letter to John Brophy, president of district No. 2, asking for a joint conference on or before Aug. 5. The operators definitely stated that they desired a wage reduction. Previous requests, not making any mention of the reason for seeking a conference, were refused for that alleged reason by the Executive Committee of the district. The association says in the letter of July 28 that "Unless ways and means can be devised of decreasing cost, the mines will be able to work less and less days, and so it is manifest that the present situation is one which seriously affects both miners and operators."

IN WEST VIRGINIA the coal cars are shunted and held, while the coal miners are hunted and shelled.—*Washington Post.*

Senate Committee Informed as to Liberal Wages Paid to Mingo Men and of Practices of Mine Workers' Union

Mingo Employees Enjoy Larger Wages than Men in Adjacent Union Fields — Company Stores Charge Less Than Independent—Violence Used on Non-Union Men by Mine Workers

AT THE session of the Senate Committee on Education and Labor in Washington, Captain J. R. Brockus, of the West Virginia State police, testified that in the Mingo County disorder and strike members of the mine workers' union were among the assailants of the state police, using high-powered rifles, three officials being shot in the back. He denied that the police had acted in a high-handed manner or destroyed property or evicted miners. He said that 273 families were living in tents in Mingo County, including 284 women and 1,304 children. The men living in tents were not all, as is commonly alleged, striking miners who had been evicted from company houses and who consequently had nowhere else to go. Some of those living in tents near Williamson had come from Kentucky at the instigation of union officials. He said that rifles and ammunition had been concealed in the houses of the mine workers.

Harry Olmsted compared the wages paid in the Mingo field with those in the unionized sections of West Virginia. He submitted a comparative statement of the wages paid in October to the five miners at the twenty-six mines in the Williamson field who earned the highest sums for the month at each mine as compared with the five highest-paid miners at twenty-six mines in the Kanawha field, which is unionized.

According to Mr. Olmsted the average wage for the month of October at twenty-six mines in the Williamson field was $293.03. The average deductions were $52.14 and the average sum paid in cash to each miner was $240.89.

The average wages paid to miners in the Williamson field exceeded by $85.93 the average wages paid to the same number of miners in the unionized mines in the Kanawha field. The average deduction from the miners' pay in the Williamson field was only $1.77 greater than in the Kanawha field, so that the average miner in the Williamson field received $85.93 more than the average Kanawha miner after all deductions are considered.

Company Store Prices for Food Not Excessive

To prove that prices at the company stores were not excessive Mr. Olmsted compared the cost of eighteen domestic foods as obtained at two independent stores operating in Williamson and seven company stores selected within the field. The two independent stores selected are the leading grocery stores of Williamson. The plant stores selected were put upon the list without any previous investigation, and were chosen as typical of the stores throughout the field. He added that the company stores handled the highest grade of products that the market affords. Table II shows these figures.

Petitions have been presented to the committee, said Mr. Olmsted, carrying the names of 4,931 workmen out of a total of 5,200 men on the payrolls, June 30, 1921. These petitions set out "that the workmen are entirely satisfied with the terms of their employment; that they do not wish to become members of the United Mine Workers or to be interfered with in their relations with this organization, and that they wish that your committee shall make no finding that will render probable any disturbance of their present relations with their employers."

"These petitions," said Mr. Olmsted, "while originating with the Labor Committee of the operators' association, were all circulated, generally by the men themselves, and the signatures were purely voluntary; the men signed them not only freely but eagerly. In some cases workmen learning that such petitions were in existence presented themselves to the office of the company for which they worked and inquired about them and asked permission to sign them. Instances of this sort are not isolated and can be shown to have existed in large numbers and at various places.

"At one colliery the impression got out that the petition was for the purpose of soliciting and obtaining members for the United Mine Workers of America; with this understanding the men refused to sign. After the exact nature of the petition had been explained to them the men signed *en masse*. In a large number of instances 100 per cent of the employees set their names to the documents. No workman approached declined to sign the petitions. The employees who failed to sign did so solely because of lack of opportunity."

Discussing the difficulty in getting the union to keep the collective bargains they so noisily advocate and so readily break, Mr. Olmsted said:

"The record of the operations of the United Mine Workers' organization in the State of Kansas show that for forty-five months, ending Dec. 31, 1919, there were 705 separate strikes at individual mines in the state involving a loss to the men in wages (as figured at the scale rate per day per man) of $3,866,780.34. The strikes averaged 15⅞ per month. All of these strikes were called and maintained in violation of specific contract provisions."

TABLE II. FOOD PRICES AT INDEPENDENT AND COMPANY STORES

	Independent Stores		Company Stores	
	Culross	Lilly	Borderland	Thacker
Flour, per 24 lb. bag	$1.86	$1.75	$1.50	$1.60
Meal, per 10 lb. bag	.35	.30	.30	.35
Pinto beans, per lb.	08½	...	.10	.12½
Navy beans, per lb.	.08½	.10	08½	08½
Potatoes, per bu.	3.25 new	3.00 new	3.00 old	3.00 old
Lard, per lb.	.25	.25	.20	.22
Butter, per lb.	.50	.50	.60	.45
Corn, standard 2-lb. can	.20	.20	.12½	.15
Tomatoes, 2½-lb. can	.20	.20	.20	.18
Sugar, per lb.	.10	.10	.10	.10
Eggs, per doz.	.35	.35	.35	.35
Cheese, per lb.	.45	.45	.40	.30
Round steak, per lb.	.40	.40	.40	.35
Porterhouse, per lb.	.50	.45	...	.40
Rump roast, per lb.	.40	.35	.35	.30
Soup beef, per lb.	.25	.25	.35	.25
Pork loins, per lb.	.35	.35	.35	.35

TABLE I. WAGES IN MINGO FIELD COMPARED WITH THOSE IN THE KANAWHA FIELD.

Name of Miner	Campany or Mine	Gross Wage	Deductions: Smithing	Coal	Doctor	Store	Rent	Lights	Misc.	Union	Cash Received
Mingo Field											
Mike Butkrouch	Bailey Coal Co.	$406.23	$0.50	....	$1.00	....	....	....	$0.50	....	$404.23
Henry Markhoutz	Crystal Block Coal & Coke Co.	509.74	....	$0.50	0.50	$36.00	....	....	....	....	472.24
John Rabe	Majestic Coal Co.	404.13	0.50	2.00	2.00	50.00	$8.00	$1.25	....	....	340.80
G. F. Cotton	Marietta Mine	480.40	0.50	1.00	2.00	246.36	8.00	....	....	....	222.54
John Crymer	Solvay Mine	413.13	0.50	....	2.00	.....	....	....	....	....	410.63
Kanawa Field											
Thos. Catus	Sovereign Coal Co.	$377.91	0.50	1.60	3.40	0.95	6.00	....	1.50	$1.60	268.31
Steve Guyroru	Sovereign Coal Co.	367.17	0.50	2.20	....	19.00	6.00	....	1.24	1.60	333.23
Lonie Tate	Sovereign Coal Co.	352.26	0.50	2.20	3.40	.....	6.00	....	....	1.60	338.56
Mabie Korok	Kelly Mine No. 6.	331.46	0.35	....	2.50	.....	....	....	3.20	2.60	322.81
Frank Chesta	Cabin Creek Acme No. 2	351.11	0.50	....	2.50	8.00	....	....	23.84	2.60	313.67

Mr. Olmsted complained much of local law officers who were in league with the United Mine Workers, saying:

"During the progress of the strike, particularly during its earlier days, it became necessary for some of the coal companies operating in the field to solicit workmen from outside the territory and to transport them to the mines within the field for the purpose of augmenting the number of men within the field who were gradually returning to work. Upon the arrival of trains carrying workmen into the field, the railway station at Williamson was jammed with crowds of strikers, organizers and agitators. Banners were paraded declaring the existence of the strike. Upon alighting the men would be surrounded by dozens and perhaps hundreds of the strikers, who would seek first to induce them to refuse to go further and to accept transportation back.

"Should this manner of persuasion fail, it was followed by a system of abuse, scathing denunciation, vilification, threats and, in frequent cases, assaults. At times there appeared among the strikers assisting in this enterprise men who were officers of the law in Mingo County, who let it be known that they were officers of the law and sought to impress upon the newcomers the idea that their mission was illegal and would be opposed and was being opposed in support of the law."

In the closing session C. E. Lively testified that while a member of the union he served as a private detective for the mine owners. Senator McKellar, a member of the investigating committee, scored this practice, alleging that private detectives had no right to get in this way into the confidences of the mine workers' union. S. E. Avis, of counsel for the operators, defended the procedure, saying that the agents of the Department of Justice resorted to the practice of having its detectives join unions and other organizations in order to obtain information.

A. M. Belcher for the operators and Thomas L. Lewis of the New River Coal Operators' Association alleged that the mine owners in Illinois, Indiana, Ohio, and western Pennsylvania had conspired with the mine workers to unionize West Virginia and destroy the competition of West Virginia coal. Mr. Belcher declared the conspiracy dated back twenty-three years. H. W. Houston asked that the miners be given opportunity to reply to these charges.

Chairman Kenyon said it had not been determined whether anything could be gained by conducting an investigation on the spot. Counsel for the miners insisted that the committee could not secure a proper survey of the situation unless it visited the scene of the disorders.

The committee has concluded its hearings in Washington and has not yet decided whether to hold any meetings in Mingo County, West Virginia.

Georges Creek Asks Wages Cut to Meet Somerset County Competition

OUT of seventy mines in the Georges Creek region, only seventeen are in operation, the lower wages paid in Somerset County, Pennsylvania, being the cause of the cessation of operation. Somerset County has already reduced wages, and now there is a rumor that a further reduction of from 20c. to 25c. is to be made. Georges Creek will then be wholly unable to compete, and consequently the operators are asking a reduction in the wages now paid by those companies that are still working. The Somerset County field lies just north of that along Georges Creek and is a keen competitor with its southern rival.

PENNSYLVANIA COAL CO. DAMAGES MUCH PROPERTY IN EAST SCRANTON.—West Scranton is the mine-cave section of the City of Scranton but, on July 7, subsidence affected the eastern part of the city on Prescott Ave. and Ash St., about eighteen acres being disturbed by the earth movement. The Pennsylvania Coal Co., whose mines are under this section, has undertaken to make all repairs to the streets which have been necessitated by these caves. The company denies that mining the third Dunmore bed was the cause of the trouble and states that it resulted from a squeeze consequent on mining the Third Vein. On July 9, only two days after the cave, the repair of the injured buildings was started.

Regulations Issued for Operation of Coal Lands Under Land Leasing Law

REGULATIONS under which the coal lands covered by the so-called Land Leasing law are to be operated have just been promulgated by Albert Bacon Fall, Secretary of the Interior, and are to be administered by the Bureau of Mines.

The purpose of these regulations, according to a statement given out by the department, is to carry out the intention of the Land Leasing law concerning conservation on public lands and the protection of the government's interest in the coal deposits. Under the terms of the Land Leasing law the government becomes essentially a partner with the operator, and it is, therefore, essential that its interest as a partner should be safeguarded. These regulations will not be in conflict with the state laws, as it is the intention of the department to co-operate fully with the states, in order to give uniform conservation measures on both state and public lands, but in addition to protecting the public welfare the department must protect its own interest in the public land.

It will be the endeavor of the department to institute the most workable conservation measures on the public lands and use its influence for unified and similar principles of conservation within the states. As the interest of the government in this case lies in the production of the coal with the highest possible extraction from the beds at the minimum expense, the interest of the Department of the Interior as lessor and conservation agency will be essentially identical with those of the lessee who expects to make money on long-continued production from these lands.

These regulations were drawn up after conferences with many operators and it is expected that they can be applied without difficulty.

Kentucky Worked Up Again Over Possibility of Tonnage Tax on Coal

J. H. TAYLOR, candidate for Representative in the Kentucky Legislature from the Harlan-Leslie district, has made a declaration favoring a 10c. tonnage tax on coal mined in that state. As this is one of the largest coal-producing sections of the state, a victory by Mr. Taylor in the coming election may be fraught with interesting results in the session of the Legislature which begins in January, 1922.

There is much discussion, as a consequence, of the whole subject of coal taxation. Such a tax, it is believed, would mean a disturbance of the equilibrium of competition between Kentucky and the Central Competitive field on northbound shipments and between Kentucky and Tennessee, West Virginia and Virginia on southbound shipments.

Northern West Virginia Wants Wage Cut; Keeney Refuses to Initiate Move

FINDING that the mines could work only 40 per cent of full time by reason of competition from fields enjoying a lower wage scale, the Executive Board of the Northern West Virginia Coal Operators Association has been negotiating with that of the district organization of the United Mine Workers of America to obtain a readjustment which would give the miners of that section steadier work. On July 3 District President Keeney said that his district would follow any lead made by the Central Competitive District but would not initiate any.

ANTHRACITE MINE INSPECTORS GIVEN SALARY INCREASE; NOW RECEIVE $4,800 A YEAR.—Owing to legislation passed at the last session of the Pennsylvania Legislature the anthracite mine inspectors are receiving an increase in salary of $1,300 annually, making their pay $400 a calendar month. Under the same law the position was made appointive and not elective. All the former inspectors have been reappointed for four-year terms.

The Weather Vane of Industry

News Notes Chronicling the Trend of Industrial Activities on Which Depends the Immediate and Future Market for Coal

THE United States is practically through the period of violent business disturbance which began in May, 1920, according to a review of business conditions by the National Bank of Commerce in New York. "We will from time to time have visible evidences of the distressing conditions through which the country has been passing," the review continues, "but these occurrences should be regarded not as indices to forward conditions but as relating to the past. The changes which have taken place have not as yet been recognized by the business public for two main reasons. The period of normal midsummer dullness now at hand has obscured the certain evidences of improvement and there has been lacking a thorough comprehension of credit conditions.

"Failure to recognize the passing of the period of insufficient credit has resulted from lack of recognition of the fact that for a long time the credit shortage has been apparent rather than real and due in large part to the unsatisfactory character of some of the risks offered. There is now no bank credit available for operations designed to hold prices at fictitious levels. Orderly organized marketing, if fair, succeeds, but attempts to hold prices above the levels determined by international supply and demand are certain eventually to fail. American business and government alike have thus far kept clear of entanglements of this character, but even so, American business cannot avoid their indirect effects.

"The main requisite for a return toward normal conditions is the will to try for business on a level where it can be had. The period of general liquidation of the raw material markets of the United States has passed. Recent declines are due to conditions of supply and demand in specific lines. This is a normal condition. Wholesale prices of many classes of manufactures have been fully deflated. This is not true in all lines, but recent cuts in the price of steel and widespread reductions in wages indicate that adjustment in wholesale prices will not be long delayed. Retail prices show wide irregularities, and high-cost stocks have been largely disposed of. Price stabilization is, therefore, not far ahead."

Railroads Add Men at Lower Wages

As a result of the recent wage reduction the railroads are employing more men, made necessary because of increased work on maintenance and other repair work. Practically all the carriers delayed work on additions and betterments until they could take advantage of the 12 per cent reduction in wages which went into effect July 1, and which was estimated to mean an annual saving for the roads of $400,000,000. Substantial increases in the number of men now employed are reported by the New York Central, Pennsylvania, Seaboard Air Line, Erie, Lackawanna and other roads.

The New York Central employed 63,911 men on June 1. The figures were 70,411 on July 1 and during July the officials of the Central estimate that at least 2,500 additional men have been taken on. The locomotive shops at Depew, N. Y., were reopened July 26 after a shutdown of two months, and more than 500 men re-employed at a reduced wage. These shops formerly employed 900 men, while at West Albany the locomotive shops, which have been closed for the last six months, reopened July 25 with 600 men, or half the normal working force.

The Pennsylvania system had a working force on all its lines on the last of May totaling 185,625, which was increased to 188,144 in June. The Seaboard Air Line showed increases of from 500 to 1,000 men from June 1 to the present time.

Freight Loading Figures Rebound

Loading of revenue freight on the railroads of the United States totaled 776,252 cars during the week which ended on July 16, according to reports received by the car service division of the American Railway Association. This was an increase of 136,554 cars over the preceding week, when, however, the observance of Fourth of July resulted in a drop in the total. Comparisons show that the total for the week of July 16 was 166,599 cars less than were loaded during the corresponding week in 1920 and 126,044 less than were loaded during the corresponding week in 1919, but it was approximately 1,400 cars more than were loaded during the week which ended on July 2 last and which consisted of six full working days.

Due to reduction in demand for coal cars in the Eastern district an increase of 2,525 in the number of surplus cars during the seven-day period ended July 15 was shown by reports to the car service division of the American Railway Association. The total number of surplus cars July 15 was 372,050, compared with 369,525 July 8.

Alabama Mill on Full Time

According to an announcement from Birmingham, Ala., the plant of the Dwight Manufacturing Co. has resumed on full time. This gives employment to 1,500 men.

Reading Iron Co. Mills Reopen

A puddle of the Reading Iron Co., at Reading, Pa., and a plant of the same concern at Danville, Pa., resumed operations Monday, July 25. The company's Universal Mill, at Reading, resumed Tuesday, July 26.

286,025 Idle in Pennsylvania Cities

A total of 286,025 persons were out of work in the principal cities of Pennsylvania on July 15, according to figures compiled by the State Bureau of Employment. The figures indicate there were 116,000 men and 11,550 women idle in the Philadelphia district, 50,850 in the Pittsburgh district, 14,545 in Harrisburg, 20,850 in Altoona, 14,775 in Erie, 19,290 in Johnstown, 5,890 in McKeesport, 10,250 in New Kensington, 15,375 in Scranton and 6,650 in Williamsport.

Sheet Mill Operations Gain

Sheet mill operations in the Pittsburgh district are improving, several of the independents running at the rate of 30 per cent or more, although a few are still shut down entirely. The leading interest operated at about 35 per cent during the week ended July 23, which was an improvement of 5 per cent over the preceding week.

Consult Industries to Make Government Statistics of Maximum Value

A NEW opportunity for industry to suggest how governmental statistics and research can be of maximum value to them was afforded July 29 by the Secretary of Commerce when, at his request, representatives of the principal industries assembled in Washington. The invitation was extended through the National Manufacturers' Association. While the conference was called primarily to discuss matters pertaining to the census of manufacturers, the whole subject of the department's work came in for discussion during the course of the day. After many angles of opinion had been developed, a committee of nine was appointed to perfect recommendations. W. B. Reed, secretary of the National Coal Association, was made a member of the committee as a representative of the coal industry.

Secretary Hoover opened the meeting with the explanation that it has been determined to gather the next biennial manufacturing census so as to show commodity units, as well as monetary values. The department, he said, is anxious to gather data which will be helpful without plaguing the industries.

F. M. Feiker, assistant to the Secretary of Commerce, told the assembly that the department has been conferring for a number of weeks with committees from the various industries and trades and has received a large number of suggestions as to how the department could be most helpful. The plan now is to classify and apply these suggestions in a way that will be entirely practical. Among the suggestions that the department is particularly anxious to carry into effect are those indicating how waste in industry can be eliminated and how figures can be made the basis of prophecy rather than possess only historical interest. Mr. Feiker stated that it has been developed that there are more than 5,500 trade and industrial associations in the country and that one of the efforts of the department will be to bring into closer touch associations representing buyers and those representative of sellers.

Julius Klein, chief of the Bureau of Foreign and Domestic Commerce, expressed the opinion that too much publicity had been given in the past to the plans of the government in its efforts to assist American industries to extend their markets abroad. In the future, information which is of value to foreign competitiors will be more carefully guarded so that American business men may have the full value of the government's work.

J. E. O'Toole Is New Secretary of National Retail Coal Merchants Association

JOSEPH E. O'TOOLE, of Wilmington, Del., but for the past several years an assistant on the floor of the U. S. Senate, has been selected by the National Retail Coal Merchants' Association as its executive secretary. He is a graduate of the Georgetown University law school, where he specialized in matters pertaining to taxation. Since his graduation he has continued his work as a member of the Senate's secretarial staff but never has engaged in the private practice of his profession. Mr. O'Toole states that the offices of the association soon are to be moved to Washington.

The announcement that the offices of the association are to be moved to Washington is gratifying to many interests concerned with coal. This decision is an interesting development in that this is one of the associations which has persisted heretofore in declining to make Washington its national headquarters. The producers and the wholesalers long have had representation in Washington, but the fact that the retailers did not have representation there frequently was the cause of inconvenience in efforts to learn the viewpoint of all elements engaged in the coal trade.

While some members of Congress are fond of hurling unkind remarks at the so-called lobbyists, the real truth of the matter is that most members of Congress are anxious to obtain the views of representatives of the industries. It is manifestly impossible for legislators to obtain a composite picture of any trade situation without some such point of contact.

While government departments prior to the war regarded it as unethical to encourage the formation of industrial associations, it became evident during the war that such organizations are essential if the government is to maintain close contact with the industries of the country. Recently there has been some upgrowth of sentiment against trade organizations. This wave of opposition had its inception in a report made by the Federal Trade Commission. The attitude of the Department of Justice also has been interpreted as being unfriendly to these organizations, but Secretary Hoover has worked actively with them and has shown a disposition to defend and to encourage them. An important development affecting trade associations is expected in the near future.

JOSEPH E. O'TOOLE
Executive Secretary, National Retail Coal Merchants Association

Independent Anthracite Operators Will Not Accept Fowler Bill Provisions

THE Fowler bill, which provides for the payment of 2 per cent of the mine value of the anthracite produced, probably will not be accepted by the Independent Anthracite Operators' Association. The association is expected to make a formal announcement to that effect in a few days, having arrived at that conclusion informally at a meeting held in Philadelphia. The members are awaiting final word from the counsel of the association before taking definite action. There is plenty of time for that announcement, as the Fowler and Kohler bills do not become operative till Aug. 27. The operators believe the mine-cave bills unconstitutional and they will take legal action in order to have the matter tested in the courts.

FRICK COKE CO. REDUCES WAGES 10 PER CENT.—On Saturday, July 30, the H. C. Frick Coke Co. announced that it would cut the wages of its employees 10 per cent on Aug. 1. This is the second reduction this year. The mining rate will be $2.38 per 100 bu. Unskilled inside labor will receive $4.15 a day; unskilled outside labor, $3 a day. Day labor for skilled men inside will be $5 and $5.05.

Government Regulation of Coal, Says Senator Reed, As Unjust as Seizure of All Private Industries

AFTER having withheld from publication for nearly a month the address he made in the Senate on the Frelinghuysen seasonal coal rate bill, Senator Reed, of Missouri, completed the revision of his address and allowed its publication in the *Congressional Record* of July 26.

"The remedies for high coal prices," declared Senator Reed in that address, "are not to be found within the provisions of this socialistic bill or its socialistic twin brother. Neither are they to be found in other socialistic remedies. The proposition is a plain one of providing cars and equipment to transport coal. The mines will produce it and the people will buy it at such times and seasons as their wants manifest. These were the conditions under which the country lived and prospered prior to 1914. The war is over and the interference of the government, which may in part have been justified during that great struggle, should also come to an end.

"The pending bill is but the forerunner of another bill worse than this a thousandfold, a proposition of regulation. Let me tell my friends something about this question of regulation. Let me tell it to them in language so plain it may seem brutal. Continue this system of regulation a few months longer and you will have established the fundamental principle of socialism in this country. It has been proposed here to control coal because it is a necessity of life, a great primal necessity. I grant it is a great primal necessity. But if we are going to embark upon the policy of regulating everything that is a necessity because it is a necessity, where will we stop?

Where Regulation of Primal Necessities Would Lead

"Coal is no more a primal necessity than clothing. Our ancestors wore clothes of some kind for thousands of years before they knew anything about the burning of coal. Coal is no more a primal necessity than steel or iron, because we must have the steel or iron to produce the coal, just as we must have the coal to produce the steel or iron. Destroy the steel industry, destroy the knowledge of how to produce iron and we would go back to barbarism. There would be no plow to turn the soil. There would be no reaper to harvest the crop. There would be no railroads to carry their mighty burdens across the continent. There would be no great steamships plowing the ocean. There would be no massive buildings lifting their roofs almost to the very skies. It would be barbarism.

"If we should regulate coal, clearly we should regulate steel and iron; and if steel and iron, why not copper? Why not take over and own the copper mines, because copper also is a great necessity? After the minerals that God Almighty made, then why not take under the beneficent protection of the government the things which men produce? Why not sheep that men raise and that pasture on a thousand hills? Why not go into the sheep business, because the meat and the fleece of sheep are great necessities?

"Why not take over the cotton business, because cotton is a great necessity? Why not insist that the government shall control that, for we could not get along today under modern conditions without the wonderful crop of cotton that is raised in the Southern States? Shoes are a necessity. We could by the same process of reasoning take them over. If we enter upon this scheme, if we permit the camel to put its socialistic nose into the tent, its gross body will follow, and it ought to follow. We have no more right to seize one private industry than we have to seize all private industries.

"I think it can be fairly deduced from the evidence that at many places in the United States the retailer charged profits on coal in excess of anything which can be regarded as fair. Indeed, it is difficult to understand how the prices which were charged could be maintained in certain cities of the United States unless there was a combination, express or implied, among the local dealers. This question, however, was not sufficiently investigated so that a comprehensive statement can be made. It must be apparent that combinations of the character referred to, if they exist, are violative of the laws of substantially every state of the Union, that such combinations can be speedily broken up by the local authorities, and that the duty devolves upon them to act with expedition and effect.

"If the local authorities cannot act with reference to conditions immediately concerning their respective communities, then it is certain that Federal intereference will be ineffective. Indeed, most of the transgressions are doubtless by men beyond the jurisdiction of the Federal Government.

"Bituminous coal, according to the evidence, has not been monopolized. And because of its wide distribution and widely scattered ownership, it will be very difficult, if not impossible, to ever bring it within monopolistic control. We have, then, a condition which only demands that the coal shall be taken from the ground and delivered to the people. If that is done at a fair and reasonable price, the problem is solved.

"It is alleged that coal prices have advanced enormously; that this must be the result either of a combination among the great coal operators to raise prices or of a practice by these operators, without combination, of charging excessive prices; in a word, of profiteering upon the public.

"The first part of the proposition stated is already answered. It remains to determine whether the advance in the price of coal can be charged to the rapacity of the great mine owners. As to the above charge, it is sufficient for the present to say that the evidence shows that during the war, while under government control, and later when under private control, some of the large coal mines were operated at profits somewhat higher than the profits during normal times. The evidence, however, does not demonstrate that the profits were anything like as great as those gained in many other industries. While these increased profits had an effect upon the price of coal, nevertheless it was shown that the increase of profits was only one of the small elements contributing to the enormous advance in the price of coal."

Railroads of Northwest Take Precautions To Avert Winter Coal Shortage

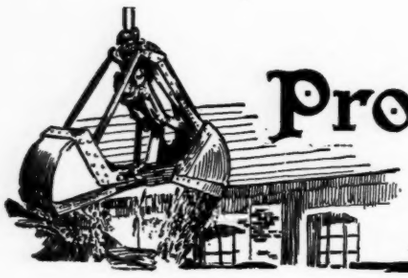
RAILROADS covering the Northwest are taking a hand in the coal situation by calling the attention of the public to the danger of an embargo and coal shortage unless a better movement from Duluth-Superior harbor over the territory is brought about immediately.

The freight department of the Great Northern R.R. has issued the following circular:

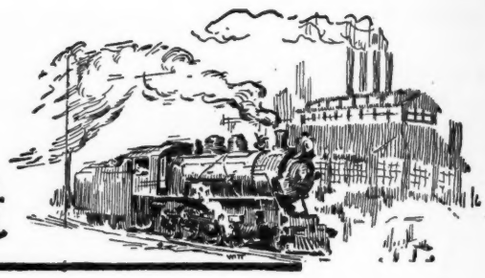
"Unless a better coal movement is brought about at once, serious congestion and a car shortage will develop this fall, when our traffic will be heavy. On the present basis of coal receipts from Lake Erie ports, and shipments from the Head of the Lakes, the docks will be filled to capacity by Aug. 1.

"The tonnage of coal required for commercial and industrial needs of the Northwest averages about the same one year with another, and should anything happen to slow down the movement via the lakes from Lake Erie ports, we are apprehensive that privation and suffering will be caused this coming winter.

"It is improbable that the Northwest will experience a recurrence of the exceptionally mild winter of 1920-21, and in order to properly take care of the situation the present supply of coal on the docks should be moved to the country, and the docks refilled before the close of navigation this year."



Production and the Market



Weekly Review

PRODUCTION of bituminous coal continues its gradual decline. The total output for the week ended July 23 was 7,369,000 net tons, compared with 7,403,000 during the week preceding. The sluggishness of the export market and the lowered Lake shipments are the responsible factors in the decline.

Close observation of all coal markets fails to disclose any material improvement in the past week. Signs are not lacking, however, that things are soon to be "on the mend." While at present the coal trade is suffering from the usual midsummer dullness, added to which is the abnormally low rate of industrial consumption, a better line of inquiry is developing. This is not resulting in the placing of much additional tonnage, but it indicates that buyers are becoming alive to the fact that when industry is again humming it will be necessary to look ahead for fuel requirements. Undoubtedly fundamental conditions have been strengthened recently. Sentiment in business has improved and it is only natural to believe that these feelers on prices and tonnage are the forerunners of orders which have been withheld until basic fuel requirements could be consistently determined.

Prices do not show any particular tendency to advance or decline. Only in screenings is there a better figure, and this of course has been the direct result of the continued lagging domestic market and the dwindling of Lake tonnage. *Coal Age* index of spot prices rose one point during the week and now stands at 90.

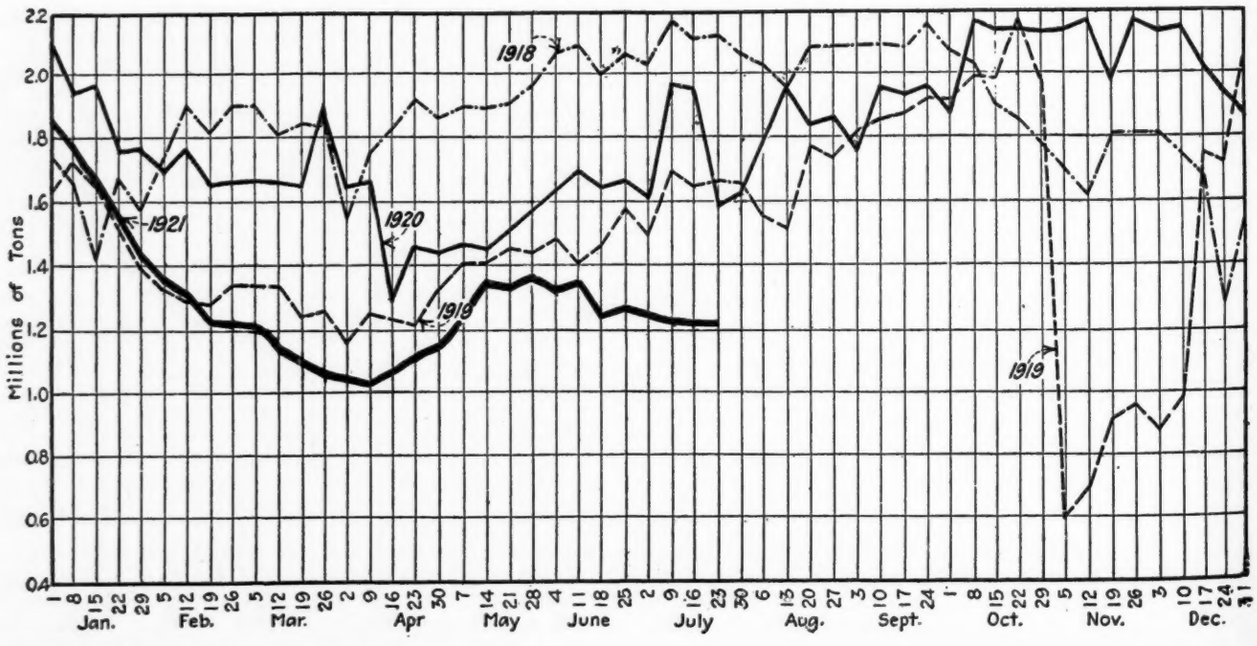
The New England market remains featureless. Active canvassing by Pocahontas and New River agencies is hitting the Pennsylvania coals via all-rail. Marine freights continue steady at low levels, making for further inland distribution of water coal. Railroads have had heavy supplies urged on them by contract shippers and with the prevailing light traffic, hold orders are inevitable in the near future.

Car Shortage in Northwest Seems Imminent

At the Head of the Lakes docks are becoming heavily stocked with coal which has been sent up from the lower ports, and while the movement to the interior has improved, the volume of orders received is far below normal and an embargo on up-bound coal-laden ships looms as all available storage space is being rapidly filled. Indications point to a heavy grain movement and a car shortage in the Northwest appears more imminent with each new day of the dilatory buying program.

The labor situation continues to occupy the limelight. In non-union fields wages have been cut to a point where competition by union operators is becoming difficult

Daily Average Production of Bituminous Coal*



*From weekly report of Geological Survey.

and this has given rise to the advisability of paring down the wage scales of the latter. However, union officials are opposing possible moves in this direction and refuse to consider any discussion of the matter. A further wage reduction was put in effect Aug. 1 by the H. C. Frick Coke Co. amounting to approximately 10 per cent.

The export market is quiet, mainly as a result of the resumption of British operations. Tidewater accumulations at Hampton Roads are not increasing, as shippers are now cautious in sending their tonnage forward, but concessions are offered to move the coal already on hand at piers to avoid demurrage. Price appears to be no consideration, however, and these cuts are not moving much coal.

BITUMINOUS

Production for the year to July 23 now stands at 219,320,000 net tons. In the same period in 1919 the output was 245,009,000 and in 1920 it was 289,191,000. Production for this period is 10 per cent behind 1919, 32 per cent behind 1918, and 25 per cent less than the average for 1917-20.

"No markets" continue to account for over 50 per cent of production loss. There was a widespread decrease in working time in the fields shipping to the Lake, and the depression grew more acute in central Pennsylvaia, northern West Virginia and most of southern West Virginia. The only fields to report an improvement were the Somerset, Cumberland-Piedmont region, the Panhandle of West Virginia, and Harlan County, Kentucky.

Soft-coal production, by groups of states, for the first six months of 1921 was 196,258,000 net tons, or one-half of that for the same period in 1920.

	First Six Months of 1921	Year 1921 at Same Rate as 1st 6 Mos.
Northeast *a*	117,970,000	235,940,000
Southern Appalachian *b*	8,439,000	16,878,000
Eastern Interior *c*	46,558,000	93,116,000
Western Interior *d*	9,605,000	19,210,000
Moutain States and Northwest *e*	13,686,000	27,372,000
Total *f*	196,258,000	392,516,000

(*a*) Michigan, Pennsylvania, Ohio, West Virginia, Maryland, Eastern Kentucky and Virginia. (*b*) Alabama, Georgia and Tennessee. (*c*) Illinois, Indiana and western Kentucky. (*d*) Iowa, Kansas, Missouri, Oklahoma, Arkansas and Texas. (*e*) Colorado, New Mexico, Utah, Wyoming, Montana, North Dakota and Washington. (*f*) Alaska, California, Idaho, North Carolina, Oregon and South Dakota not included.

Exports of bituminous coal continue to slump. Dumpings for all accounts at the Hampton Roads piers during the week ended July 28 were 340,504 gross tons, as compared with 373,811 during the week ended July 21. During the fourth week of July 179,832 net tons went for export and 82,991 for bunkers, a total of 262,823, compared with 616,-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

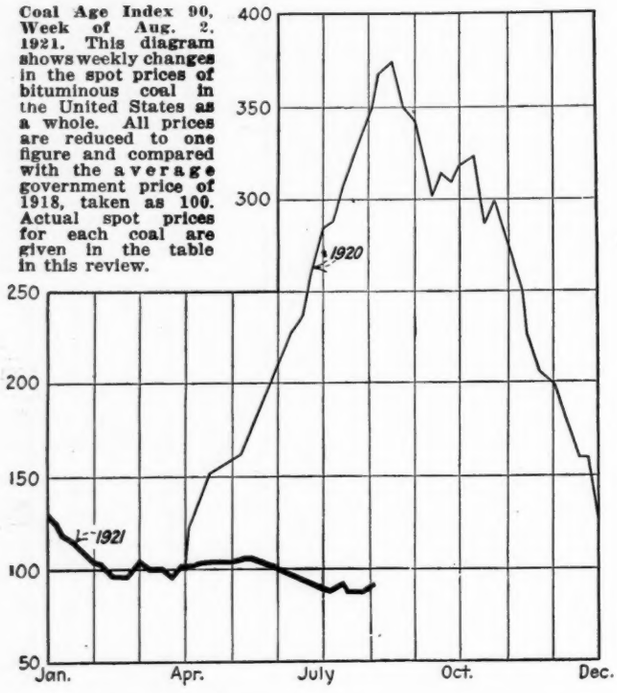
	Market Quoted	June 28, 1921	July 19, 1921	July 26, 1921	Aug. 2, 1921†
Low-Volatile, Eastern					
Pocahontas lump	Columbus	$5.65	$5.65	$5.40	*$5.00@$5.50*
Pocahontas mine run	Columbus	3.55	3.15	3.15	3.00@ 3.25
Pocahontas screenings	Columbus	2.40	2.30	2.30	**2.25@ 2.50**
Pocahontas lump	Chicago	5.65	5.00	5.15	**5.25@ 5.50**
Pocahontas mine run	Chicago	3.15	2.75	3.15	*2.75@ 3.25*
*Smokeless mine run	Boston	6.00	5.85	5.70	*5.50@ 5.65*
Clearfield mine run	Boston	2.20	2.00	1.95	*1.65@ 2.10*
Cambria mine run	Boston	2.85	2.70	2.70	2.35@ 3.00
Somerset mine run	Boston	1.95	1.80	1.75	1.50@ 2.00
Pool 1 (Navy Standard)	New York	3.20	2.90	3.15	3.00@ 3.25
Pool 1 (Navy Standard)	Philadelphia	3.00	2.80	2.80	2.75@ 2.85
Pool 1 (Navy Standard)	Baltimore	2.90	2.60	2.45	*2.40*
Pool 9 (Super. Low Vol.)	New York	2.75	2.50	2.50	**2.40@ 2.75**
Pool 9 (Super. Low Vol.)	Philadelphia	2.70	2.40	2.40	2.30@ 2.50
Pool 9 (Super. Low Vol.)	Baltimore	2.65	2.35	2.20	2.20
Pool 10 (H. Gr. Low Vol.)	New York	2.45	2.20	2.25	**2.15@ 2.50**
Pool 10 (H. Gr. Low Vol.)	Philadelphia	2.40	2.20	2.20	2.00@ 2.35
Pool 10 (H. Gr. Low Vol.)	Baltimore	2.30	2.00	2.00	2.00
Pool 11 (Low Vol.)	New York	2.15	2.00	1.90	1.85@ 2.00
Pool 11 (Low Vol.)	Philadelphia	1.90	1.90	1.90	1.75@ 2.00
Pool 11 (Low Vol.)	Baltimore	2.10	1.75	1.75	1.75
High-Volatile, Eastern					
Pool 54-64 (Gas and Steam)	New York	1.95	1.70	1.70	**1.70@ 1.80**
Pool 54-64 (Gas and Steam)	Philadelphia	1.85	1.75	1.75	1.75
Pool 54-64 (Gas and Steam)	Baltimore	1.70	1.50	1.50	1.40@ 1.60
Pittsburgh sc'd. gas	Pittsburgh	2 50	2.95	2.95	*2.60@ 2.80*
Pittsburgh mine run(steam)	Pittsburgh	1.85	2.10	2.10	2.00@ 2.15
Pittsburgh slack (gas)	Pittsburgh	1.60	1.45	1.45	**1.60@ 1.75**
Kanawha lump	Columbus	3.45	3.30	3.15	*2.50@ 3.25*
Kanawha mine run	Columbus	2.20	2.00	2.15	*1.75@ 2.25*
Kanawha screenings	Columbus	1.20	1.20	1.20	**1.25@ 1.40**
Hocking lump	Columbus	3.15	3.25	3.15	3.00@ 3.25
Hocking mine run	Columbus	2.10	2.15	2.15	2.00@ 2.25
Hocking screenings	Columbus	1.20	1.25	1.30	*1.20@ 1.35*
Pitts. No. 8 lump	Cleveland	3.25	3.25	3.25	3.00@ 3.50
Pitts. No. 8 mine run	Cleveland	$2.10	$2.20	$2.20	**$2.25@$2.35**
Pitts. No. 8 screenings	Cleveland	1.15	1.25	1.35	**1.35@ 1.50**
Midwest					
Franklin, Ill. lump	Chicago	3.55	3.55	3.55	3.00@ 4.05
Franklin, Ill. mine run	Chicago	2.90	3.00	3.15	**2.75@ 3.55**
Franklin, Ill. screenings	Chicago	1.90	1.95	1.90	1.75@ 2.00
Central, Ill. lump	Chicago	2.65	2.50	2.50	2.00@ 3.00
Central Ill. mine run	Chicago	2.40	2.40	2.25	2.00@ 2.50
Central Ill. screenings	Chicago	1.65	1.75	1.60	1.40@ 1.75
Ind. 4th Vein lump	Chicago	2.90	2.80	3.65	3.50@ 3.65
Ind. 4th Vein mine run	Chicago	2.50	2.50	3.05	2.90@ 3.25
Ind. 4th Vein screenings	Chicago	1.65	1.85	2.15	2.00@ 2.25
Ind. 5th Vein lump	Chicago	2.75	2.75	2.90	2.75@ 3.00
Ind. 5th Vein mine run	Chicago	2.40	2.40	2.60	*2.25@ 2.65*
Ind. 5th Vein screenings	Chicago	1.65	1.75	1.90	*1.50@ 1.75*
Standard lump	St. Louis	2.15	2.25	2.25	2.00@ 2 50
Standard mine run	St. Louis	1.75	1.70	1.70	1.65@ 7.75
Standard screenings	St. Louis	0.85	0.85	1.00	1.00
West Ky. lump	Louisville	2.65	2.75	2.90	2.60@ 3.25
West Ky. mine run	Louisville	2.00	2.25	2.30	2.00@ 2.65
West Ky. screenings	Louisville	1.55	1.60	1.55	**1.25@ 2.00**
South and Southwest					
Big Seam lump	Birmingham	3.65	3.65	3.55	3.00@ 4.05
Big Seam mine run	Birmingham	2.50	2.15	2.15	2.00@ 2.25
S. E. Ky. lump	Louisville	3.70	3.40	3.15	**3.25@ 3.75**
S. E. Ky. mine run	Louisville	2.25	2.20	2.20	**2.25@ 2.40**
S. E. Ky. screenings	Louisville	1.40	1.50	1.35	**1.35@ 1.65**
Kansas lump	Kansas City	5.40	5.50	5.50	5.50
Kansas mine run	Kansas City	4.25	4.40	4.40	4.40
Kansas screenings	Kansas City	3.25	3.25	3.25	3.25

* Gross tons, f. o. b. vessel, Hampton Roads.
† Advance over previous week shown in **heavy type,** declines in *italics.*

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	July 19, 1921 Independent	July 19, 1921 Company	July 26, 1921 Independent	July 26, 1921 Company	Aug. 2, 1921† Independent	Aug. 2, 1921† Company
Broken	New York	$2.61	$7.75@$8.00	$7.40@$7.75	$8.00@$8.25	$7.40@$7.75	*$8.00@$8.15*	**$7 50@$7.75**
Broken	Philadelphia	2.66	8.00@ 8.20	7.55@ 7.85	8.00@ 8.20	7.55@ 7.85	8.00@ 8.20	**7.65@ 7.85**
*Broken	Chicago	5.62	12.75	12.45	12.40	12.45	12.40	12.45
Egg	New York	2.61	7.75@ 8.00	7.40@ 7.75	7.55@ 7.85	7.40@ 7.75	7.55@ 7.85	**7 50@ 7 75**
Egg	Philadelphia	2.66	8.00@ 8.20	7.55@ 7.85	8.00@ 8.20	7.55@ 7.85	8.00@ 8.20	**7.65@ 7.85**
*Egg	Chicago	5.62	12.60	12.45	12.40	12.45	12.40	12.45
Stove	New York	2.61	8.00@ 8.25	7.70@ 8.10	8.00@ 8.25	7.70@ 8.10	*7.70@ 8.00*	**7.80@ 8.10**
Stove	Philadelphia	2.66	8.40@ 8.50	7.90@ 8.25	8.40@ 8.50	7.90@ 8.25	*8.25@ 8.35*	**7.95@ 8.25**
*Stove	Chicago	5.62	13.20	12.70	12.70	12.70	12.70	12.70
Chestnut	New York	2.61	7.65@ 7.90	7.70@ 8.10	7.50@ 7.75	7.70@ 8.10	7.50@ 7.75	**7.80@ 8.10**
Chestnut	Philadelphia	2.66	8.25@ 8.60	7.80@ 8.25	8.25@ 8.60	7.80@ 8.25	*8.00@ 8.40*	**7.95@ 8.25**
*Chestnut	Chicago	5.62	12.95	12.70	12.70	12.70	12 70	12.70
Pea	New York	2.47	4.50@ 5.00	5.95@ 6.45	4.50@ 5.00	5.95@ 6.45	**4.50@ 5 50**	**6.05@ 6.45**
Pea	Philadelphia	2.38	4.50@ 6.00	6.00@ 6.20	4.50@ 6.00	6.00@ 6.20	4.50@ 6.00	**6.10@ 6.20**
*Pea	Chicago	5.62	10.90	11.20	11.10	11.20	11.10	11.20
Buckwheat No 1	New York	2.47	2.65@ 3.00	3.50	2.50@ 3.25	3.50	2.50@ 3.25	3.50
Buckwheat No. 1	Philadelphia	2.38	2.50@ 3.00	3.50	2.50@ 3.00	3.50	2.50@ 3.00	3.50
Rice	New York	2.47	1.60@ 2.00	2.50	1.60@ 2.00	2.50	**1.75@ 2.25**	2.50
Rice	Philadelphia	2.38	1.75@ 2.00	2.50	1.75@ 2.00	2.50	1.75@ 2.00	2.50
Barley	New York	2.47	0.60@ 1.25	1.50	0.60@ 1.25	1.50	**0.75@ 1.25**	1.50
Barley	Philadelphia	2.38	0.75@ 1.25	1.50	0.75@ 1.25	1.50	0.75@ 1.25	1.50
Birdseye	New York	2.47	.....	2.50	....	2.50	....	2.50

* Prices and freight rates net tons; quotations f.o.b. cars, Chicago.
† Advances over previous week shown in **heavy type,** declines in *italics.*



Coal Age Index 90, Week of Aug. 2, 1921. This diagram shows weekly changes in the spot prices of bituminous coal in the United States as a whole. All prices are reduced to one figure and compared with the average government price of 1918, taken as 100. Actual spot prices for each coal are given in the table in this review.

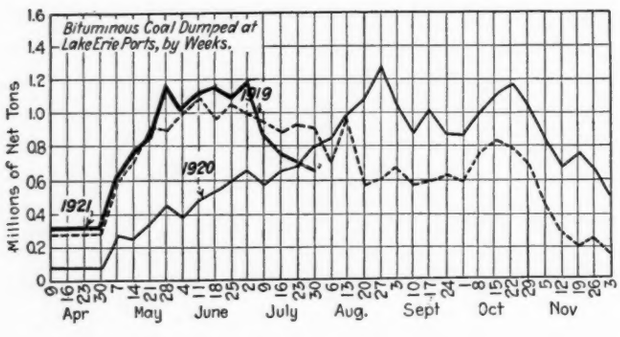
869 tons for the first week of July. The only coal now moving to Great Britain—during the strike the mainstay for American overseas tonnage—is on contracts made some time ago and where coal has been delayed in transit.

For both anthracite and bituminous coal an increase in the rail movement to New England is reported by the Geological Survey. During the week ended July 23 3,160 cars of hard coal and 3,018 of bituminous coal went forward.

CARS OF COAL FORWARDED OVER THE HUDSON TO NEW ENGLAND

Week Ended	1921 Anthracite	1921 Bituminous	1920 Anthracite	1920 Bituminous
July 9	3,228	2,647	1,169	5,904
July 16	3,090	2,444	2,066	6,154
July 23	3,160	3,018	2,377	7,033

Dumpings at the lower ports for Lake shipments are falling off. Mine loadings show the effect of the jam at the Head-of-the-Lakes and much less tonnage is now rolling. For the season to Aug. 1, this year, nearly 14,000,000 net tons have gone up the Lake, compared with 6,814,074 last year and about the same as in 1919. Preliminary figures for the week ended July 31 show 699,113 tons cargo and 25,574 of vessel fuel dumped, a total of 724,687 tons, less than during any week since early in May. Inability of Northwestern dealers to finance the carrying of stocks and refusal of industrial and domestic consumers to order their coal are accountable for the slow movement off the docks.



The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., has sent out proposals for bids, receipts to be opened Aug. 23, 1921, covering approximately 600,000 tons of bituminous and semi-bituminous and 12,000 tons of anthracite coal.

The Great Northern, Northern Pacific and Soo Line railroads are reported to be in the market and to have bought heavily for future needs. No account of the coal contracted for or the price paid has been given out so far.

ANTHRACITE

Production of hard coal continues to hold up remarkably well, despite the belief that the markets had nearly reached the saturation point. The output for the week ended July 23 was 1,837,000 net tons, about 40,000 less than in the last preceding week. The larger companies put the usual 10c. monthly advance Aug. 1 on the domestic sizes, while growing pressure to make sales has caused a softening of independent prices. Retail prices were advanced to cover, and in many cases an additional 15c. per ton was put on to cover the new Pennsylvania state tax. A generally dull anthracite market is now reported and more coal must go into storage if production is to be maintained.

COKE

Beehive coke output fell off again, 39,000 net tons being the figure for the week ended July 23. Connellsville foundry demand has picked up a little, especially on high-quality coke. Spot Connellsville furnace is now quoted $2.90@$3; contract, $3; spot foundry, $4@$4.50.

Estimates of Production

FROM THE WEEKLY REPORT OF THE GEOLOGICAL SURVEY
(NET TONS)

BITUMINOUS COAL

Total Bituminous, Including Coal Coked

	1921 Week	1921 Calendar Year to Date	1920 Week	1920 Calendar Year to Date(a)
July 9b	6,165,000	204,548,000	9,659,000	267,841,000
Daily average	1,233,000	1,278,000	1,932,000	1,668,000
July 16b	7,403,000	211,951,000	10,880,000	278,721,000
Daily average	1,234,000	1,276,000	1,813,000	1,673,000
July 23c	7,369,000	219,320,000	10,470,000	289,191,000
Daily average	1,228,000	1,274,000	1,745,000	1,675,000

(*a*) Less 2 days' production during New Year's week to equalize number of days covered for the last two years. (*b*) Revised from last report. (*c*) Subject to revision.

ANTHRACITE

	1921 Week	1921 Calendar Year to Date	1920 Week	1920 Calendar Year to Date (a)
July 9b	1,525,000	47,634,000	1,541,000	46,149,000
July 16	1,876,000	49,510,000	1,840,000	47,989,000
July 23	1,837,000	51,347,000	1,819,000	49,808,000

(*a*) Less 2 days' production during New Year's week to equalize number of days covered for the last two years. (*b*) Five-day week.

BEEHIVE COKE

Week Ended July 23 1921a	Week Ended July 16 1921b	Week Ended July 24 1920	1921 to Date	1920 to Date c
39,000	44,000	385,000	3,515,000	12,016,000

(*a*) Subject to revision. (*b*) Revised from last report. (*c*) Less two days' production during New Year's week to equalize number of days covered for the last two years.

WANT HEALTH INSURANCE, OLD-AGE AND UNEMPLOYMENT PENSIONS.—John Collins (Kolodziejak), president of district No. 1, in presenting his report to the district convention on July 18 urged legislation providing health insurance, old-age pensions for old and infirm workmen and unemployment pensions. He recommended that union dues be raised from 75c. to $1 and announced the union's intention to resist all wage reductions. Secretary-Treasurer Mack said that the treasury contained $41,210.78, of which $20,000 was in bank credits, Liberty bonds and other investments. Several locals were behind in their per-capita tax. The average monthly membership from July, 1919, till June 30, 1920, was 28,896, the receipts during that period being $169,588.39 and the expenditures $119,377.61. Since the Compensation Act went into effect $9,624,244 had been awarded injured employees or their survivors in district No. 1.

Foreign Market And Export News

European Coal Situation

(By cable to Coal Age)

GREAT BRITAIN—Provisional figures compiled by the British Government place the output during the week ended July 9 at 2,355,000 gross tons. The output during the week ended July 16 was 3,927,000 tons.

British quotations as of Aug. 1 are as follows: Best Admiralty large, f.o.b. Cardiff, 45s.@46s.; best Cardiff smalls, 25s.@27s. 6d. Newcastle-on-Tyne quotations are: Best steams 42s. 6d.; best gas, 38s. 9d. Best bunker coal is quoted, Newcastle-on-Tyne, at 35s.@37s. 6d. per ton, with prices weakening with the increase in production.

HOLLAND—American coal is quoted at Rotterdam, $8@$9 per ton; British coal 25s.@40s.

ITALY—No supplies of British coal are available on the Milan market. American steam coal is selling 315@320 lire per ton.

BELGIUM—Antwerp price on Belgian bunker coal is quoted at 135 francs.

GERMANY—Berlin reports the output in the Ruhr region, during the week ended July 16, as 1,760,000 tons. No returns are issued covering Upper Silesian production, owing to the disturbances in that district.

French Coal Imports for May

(By cable to Coal Age)

	Metric Tons
United States	39,000
Belgium	127,000
Great Britain	102,000
Germany	443,000
Sarre Region	45,000
Other countries	19,000
Total	775,000

Reduction of Belgian Coke Prices

A considerable reduction in the prices of coke is officially announced, and prices have been fixed as follows:

Furnace coke	110 Fr.	(formerly 117)
Half screened	112.50 "	(formerly 120)
Screened	145 "	(formerly 160)
Special coke	150 "	(formerly 165)

Prices for coal to industries and households have not been reduced but those for industrial briquets have been lowered by 8 francs per ton.

C.I.F. Prices, American Coal Gross Tons, July 30

	Low Vol.	High Vol.
River Plate	$10.15	$9.60
French Atlantic, including Marseilles Havre and St. Nazaire	11.15	10.40
West Italy, including Palermo and Naples	11.65	11.00
Scandinavian Ports	11.50	10.85

U. K. prices not quoted, due to practical ending of coal shipments. Prices to the Far East also are not sufficiently fixed to admit of authentic quotations.

COAL UNLOADED IN FRENCH PORTS

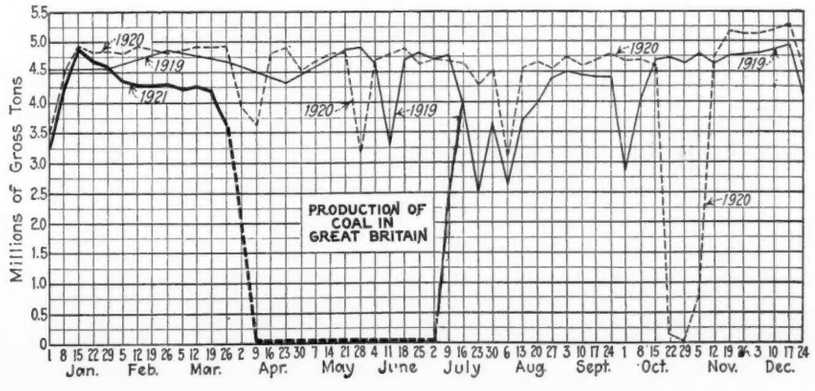
(In Metric Tons)

	Week Ended June 23	Week Ended June 30
CHANNEL PORTS		
Dunkirk	3,386	.....
Boulogne	1,578	1,465
Dieppe	2,325	1,238
Le Havre	12,500	10,650
Rouen	21,400	14,600
Caen	6,243	2,925
Cherbourg	5,389	3,486
Saint-Malo-Saint-Servan	1,897	.....
Fecamp	1,550	735
Honfleur	1,122	1,090
Trouville	1,388	.....
ATLANTIC PORTS		
Brest	6,810	2,928
Saint Nazaire	12,414	9,681
Nantes	8,615	6,072
Bordeaux	8,519	930
Bayonne	1,524	.....
Marseille*	19,498	15,653
Lorient	2,046	2,323
Les Sables-d'Olanne	900	946
La Rochelle-Ville	.....	1,892
Total	119,104	76,614

* Mediterranean port.

RICH SPANISH COAL DEPOSITS have been found in the Guadalquivir River Valley, and the exploitation of the beds has been begun. This is likely to prove another valuable coal district to be added to those of the Asturias, Leon and Ciudadreal.

STORAGE SPACE AT COLOMBO is occupied and it is practically impossible to store coal still arriving and to arrive. So far as Ceylon is concerned, no more Indian coal will be required till the end of the year, as present stocks and contracts to be filled are sufficient for requirements.



Quiet Hampton Roads Market

Buying is still on the downgrade, although prices are on the level of the last few weeks. Pools 1 and 2 have a range of $5.75@$6 and in some instances have been cut to $5.50. Other pools are quoted at $5 with only few acceptances. The lack of activity in the market is not a question of price but of general sluggish business.

Dumpings declined during the week ended July 28, only 340,504 gross tons passing over the piers, as compared with 373,811 tons the week preceding.

PIER SITUATION

	Week Ended July 21	Week Ended July 28
N. & W. Piers, Lamberts Point:		
Cars on hand	2,793	3,067
Tons on hand	135,076	151,387
Tons dumped	182,047	149,907
Tonnage waiting	48,850	28,175
Virginian Ry. Piers, Sewalls Point:		
Cars on hand	2,111	2,343
Tons on hand	105,550	131,850
Tons dumped	59,039	101,184
Tonnage waiting	5,673	28,501
C. & O. Piers, Newport News:		
Cars on hand	2,502	2,633
Tons on hand	125,100	131,650
Tons dumped	132,725	89,413
Tonnage waiting	80,800	2,790

Buying for British markets has come to a standstill. The only cargoes clearing for Great Britain are those contracted for several weeks ago and delayed in transit.

The coal piers are not crowded and while the accumulations at Tide are approximately the same as during the last two weeks, many shippers have offered to make pronounced cuts to keep their stocks moving and obviate demurrage.

CLEARANCES

For Argentine:		
Du. SS. Maashaven	for Guanaco	493
For Atlantic Islands:		
Dan. SS Harald	for Barbados	2,442
Am. SS. Edward Pierce	for Martinique	5,796
Br. SS. Clan Macindoe	for St. Vincent	5,828
Br. SS. Burnholme	for St. Vincent	4,976
Am. Schr. Ella Little	for Teneriffe	1,173
For Brazil:		
Br. SS. Penrose	for Buenos Aires	5,210
Nr. SS. Coquetmede	for Buenos Aires	5,108
For Canal Zone:		
Am. SS. Cristobal	for Cristobal	9,181
For Chile:		
Nor. SS. Wilfrid	for Valparaiso	1,503
For Colombia:		
Nor. SS. Bana	for Santa Marta	1,371
For Cuba:		
Nor. SS. Mt. Vernon	for Antilla	839
Am. SS. Munindies	for Havana	2,109
Br. SS. Beacon Grange	for San Juan	2,676
For France:		
Ital. SS. Laura	for Marseilles	4,036
For Gibraltar:		
Nor. SS. Earle		7,162
Br. SS. Kalimba		6,717
Am. SS. Kentuckian		8,141
For Greece:		
Grk. SS. Charalambos	for Piraeus	7,374
For Italy:		
Du. SS. Celebes	for Italian Ports	6,279
Jap. SS. Jufuku Maru	for Messina	5,209
Ital. SS. Ancona	for Naples	5,688
For Russia:		
Nor. SS. Borgild	for Petrograd	4,987
Br. SS. Airedale	for Petrograd	4,463
For Uruguay:		
Dan. SS. Nevada	for Montevideo	5,196
Jap. SS. Hofuku Maru	for Montevideo	7,021
Br. SS. Trehawke	for Montevideo	6,213
Am. SS. Panaman	for Alexandria	8,150
Br. Schr. Nova Queen	for Hamilton	737
Br. SS. Mayari	for Kingston	3,423
Am. SS. J. K. Mitchell	for Nassau	444

IN ITS ANNUAL STATEMENT, according to a London report, the Russo-Asiatic Consolidated, the big Siberian mining corporation, says that negotiations are proceeding for the return of confiscated properties and for a resumption of operations.

GREAT BRITAIN'S COAL EXPORTS in June amounted to but 8,000 tons. This compares with 1,951,000 tons in June, 1920, and with 6,006,000 tons for the same month in 1913. Exports of coal for the first six months of the current year amounted to 6,025,000 tons. This compares with 14,432,000 tons for the same period of last year and with 35,526,000 tons in the first half of 1913.

A SHIPMENT OF ASIATIC COAL, the first to reach San Francisco in five years, was aboard the Japanese S.S. *Seine Maru*, which arrived recently. The coal was shipped from Darien, Manchuria.

Italian Prices Reduced

Italian State railways have reduced the prices of coal supplied by them to private industries. In the case of coal for ships the prices will be increased by cost of transport, loading, customs, etc.

The following prices cover tonnage delivered free on truck, on barges in the ports, or delivered by trucks for foreign countries, previous contracts notwithstanding:

	Lire.
Westphalian steam coal	275
Belgian and Upper Silesian steam coal	260
For furnaces and gas—	
(Splint and the like) Westphalian	275
(Splint and the like) Upper Silesian	260
Belgian slack	260
Metallurgic coke, Westphalian	380
Metallurgic coke, Upper Silesian	350

SUEZ CANAL COAL SHIPMENTS up to 1914 averaged about one million tons annually, while in 1919 they amounted to only 242,000 tons and decreased to 118,000 tons in 1920.

Reports From the Market Centers

New England

BOSTON

Trend Continues Unfavorable — Pennsylvania Grades in Very Light Request — Railroads Have Greater Reserves Than Situation Warrants — Anthracite Dull.

Bituminous—If anything, the market is even weaker than previously reported. Steam-users are so besieged with offers that they very naturally conclude to wait further developments. The whole trend for several weeks has been toward lower prices, and at this writing new low levels have been touched by producers.

There has been a small amount of buying on the part of plants using 5,000 tons or less per year, but even those purchases have been for delivery extended through the fall and cannot be called spot business. Moreover there is such activity on the part of the smokeless agencies to market their Pocahontas and New River that a very considerable tonnage will probably be lost to Pennsylvania interests who have come to depend upon certain trade because of the relatively lower cost of the all-rail route that prevailed from 1915 until a few months ago. There are signs that the pendulum will swing back until the old-time two-thirds of New England's requirements will come forward by the water route.

Inquiry is so light that whole districts in Central Pennsylvania are scarcely turning a wheel. The fair to medium grades have next to no outlet in New England under present conditions. The through tariff is so high that buyers are inclined closely to examine the evaporative qualities of coals offered, and any such comparison of course works to the advantage of the low ash grades of high fusing temperature. There are plenty of those to meet the limited needs of the few who are interested.

It develops that the railroads here have on hand much larger stocks than was supposed. Early in the year they made purchases based upon normal business and it is probable also that the ability of producers to furnish full quotas was somewhat discounted. In any case, the shippers have pressed the railroads all along to take coal and as a result there is more on hand than the situation warrants. In view of continued light traffic it would be in no wise surprising if the New England railroads should soon notify their coal contractors to withhold deliveries for the present.

At Tidewater the amount of coal dumped has been reduced to relatively small limits. It is a commentary on the state of the market that notwithstanding the lowest water freights since pre-war times there has been no improvement in tonnage by this route. At Baltimore, Philadelphia, and at New York the bulk of what coal is transferred into boats is either for bunker purposes or moves on over-sea contracts. The volume coastwise is extremely light, with no better market in sight.

There are still heavy accumulations at Hampton Roads. Many of the agencies have been embargoed and there are observed the same hectic efforts to place coal in any direction where it can be absorbed. Prices have receded still further f.o.b. vessel, as well as on cars at points like Boston, Providence, and Portland. Marine freights continue easy on a $1.15@$1.25 basis, thereby making possible sales of the smokeless coals much farther inland than has been the case for some years.

Anthracite—All the domestic sizes, with the possible exception of stove, are now in ample supply with practically all shippers. There is a dearth of orders, even with the companies who are usually well supplied, and August will see either a suspension of mining or large quantities going into stock piles in the mining region. Retail trade is still almost unbelievably dull; dealers are at their wits end to induce the public to take on coal.

Tidewater—East

NEW YORK

Anthracite Demand Wanes — Yards Heavily Stocked — Wage Reductions Affect Bituminous Quotations, but Futures Stiffen.

Anthracite—The let-up in consumer demand is now being felt in full force. The point has now been reached at last where a great many dealers are stocked up to the limit and have had to call a halt on shipments.

It is a noteworthy fact that, in spite of all the talk about dullness, mining operations continued on practically a full-time basis right up to the end of July. However, some of the individuals have had to curtail during the past fortnight.

Independent tonnage has been offered in limited quantities this week as low as $7.35 for egg and nut and $7.60 for stove, but most of the small operators seem disposed to close down rather than sell below the circular, in view of the low figures at which there are obliged to dispose of their steam sizes.

Buckwheat is available as low as $2.50 on ordinary grades, although the better grades are commanding $2.75@$3.25 in the line trade. The market on independent rice is $1.75@$2.25, and on barley 75c.@$1.25.

Bituminous—The trade at the end of July was in much the same position as at the beginning of the month. There have been times when it seemed as if the demand was reviving, but no real expansion occurred. Some consumers are taking a little more interest in providing against next winter's requirements, either by stocking up or contracting, but thus far their activities have been largely confined to feeling out the market.

A factor which will tend to cause still greater unsettlement is the wage reduction put into effect in Somerset County, Pa., about the middle of July.

As the small operators have been selling at prices based on the reduced scale for some little time past, it may be that quotations will not go any lower right away, but the latest cuts will mean an increased tonnage offering at the low figures and eventually this is apt to result in still further recessions. In any event, the latest Somerset reduc-

tions have added to the troubles of the operators in Cambria County and other organized districts, whose labor costs are above those of their non-union competitors.

Coal from selected mines in the various classifications sometimes brings a premium, and it is difficult to obtain tonnage for shipment over a term of weeks at the minimum prices quoted. Producers are inclined to take a firmer stand on business running beyond the middle of August. Slack has stiffened up considerably. Export demand shows practically no sign of revival.

There has been a slight increase this week in tonnage standing at the piers outside of the pools. At the same time, most of it appears to have been shipped on orders and contracts, so that the pressure on the market has not increased. Prices remain practically unchanged, $5.90@$6.15 f.o.b. piers for Pool 9 and $5.50@$5.70 for Pool 10. The tidewater market has been a little quieter.

PHILADELPHIA

Anthracite Demand Quiet — Mines on Short Time — August Prices Little Changed — Tax Rumors — Reports of Bituminous Contract Adjustments — Efforts at Wage Reductions.

Anthracite—The low-water mark in retail deliveries seems to have been passed, as last week was if anything a shade better. However, with capacity stocks in the yards, retailers are content to deliver from them and are not at all inclined to take in additional coal. Their idea seems to be to get in more money for the coal they have out before they add to their stocks.

This has resulted in much shutting down at the mines. The greatest amount of idleness is among the independent operators and most of them are now working on a three-day schedule.

As to August prices, some of the independents have already announced that they do not intend to make any increase, although the companies in two cases at least have decided on the regular 10c. monthly advance. Under these conditions the retail dealers are not at all likely to add to their delivered price to the consumer, although it would be no surprise should there be an advance of 25c. after Sept. 1.

Dealers have lately been stirred by a rumor that some of the big companies intend within the next month or so to bill their costumers for the tax, no mention of which was made by any of them when the law became effective on July 1. Should this happen it would not be much of a guess to say that a few of the retailers would actually resist payment, on the ground that they have already sold much of the coal at the prices as billed by the companies.

Bituminous—The market seems to be watching the calendar, as the impression grows that as we approach Sept. 1 the consuming interests will awake in a moderate degree to the necessity of storing some coal in excess of current needs. There are already a few instances where consumers who had been holding off contract negotiations, have gone into the market and bought spot blocks for storage.

There has lately been a little stir in the contract market by rumors that some big shippers were adjusting their prices downward. In one instance it was said that the contract figure of $4.20 on good steam coal was brought down to $3.80. Should this prove to be correct it is likely that the reduction will be met by other shippers, with adjustments for all coal previously shipped. It is believed this is being done to cope with the practice of contract customers taking advantage of the low spot prices.

There has been no appreciable change in spot prices, and the tendency is altogether stationary. Exceptionally low prices are occasionally heard, and these are usually on coals from non-union regions where the operators have succeeded in having their men accept a wage adjustment. Some operations under strict union schedule have been pushed out of the market by mines able to produce at a much lower rate.

It cannot be said that business conditions have greatly improved in this district, but they certainly have not gone backward. We have personal knowledge of iron furnaces getting under way for short turns, and the textile trade which only a few months ago was anticipating summer dullness gives every appearance of being able to go right through to fall.

BALTIMORE

Trade Encouraged by Better Line of Inquiry — Demand Not Sufficient to Overcome Low Price Conditions—Hard Coal Still at Standstill.

Bituminous—Soft coal dealers as a whole seem a bit more optimistic as a result of a better line of inquiry for deliveries in the near future. This line of inquiry, which is coming into a fair proportion of the offices here, has not so far been of such extent as to stiffen prices, but it does give a hopeful tone to the trading which has been woefully lacking for some weeks past.

Best grade steam coals are still offering at prices below actual production cost in spots, this being especially true of those operations which have been unable to arrange a cut in mine wage scales. The tone of inquiry is possibly stronger from some of the towns of Western Maryland than from the Baltimore district, as yet, for the odd feature of the expected business revival seems to be that it is gradually working its way eastward.

The export situation, which lagged for some days in July is again showing evidence of activity, although the late heavy call from Great Britain is totally lacking. The report for the first 28 days of July shows a total loading on 46 ships of 289,185 tons cargo, while 31 of these took an additional 30,637 tons bunker.

Anthracite—The situation here is at a complete standstill and coal men are showing more and more signs of worry over the jam that is sure to come in September when everybody will want coal at one time and the supply will be impossible on a satisfactory basis. The trade has hoped that the Grand Jury investigation would wind up rapidly and that the public would come to realize that by waiting they are not going to get lower prices, but this hope has been vain so far. There is practically no ordering and distribution at this time.

The dealers have held several meetings to discuss some method of educating the public away from the thoughts created by false information fed to them recently by a daily newspaper.

BUFFALO

Trade Lagging as Usual—Factories All on Short Time — Anthracite by Lake Brisk—Slight Stir in Coke Trade.

Bituminous—It is hard to find a shipper who is doing much business. Everything is in a listless condition and it promises to remain so for a considerable time yet. Not till general business begins to recover will coal sell at a brisk rate again.

It is the operators who are faring worst, for the trade is commonly in such condition that most mines need to run actively to make sure of a profit. The sudden falling off of the export demand and the slowing down of the Lake trade have both hit the mines hard and there is nothing to make up for the decline, for the consumer will not buy more than is required for present use.

Prices continue weak and unsteady, being consumers' figures mostly, at $3 for Youghiogheny gas lump, $2.50@$2.75 for Pittsburgh and No. 8 steam lump, $2.25 for Allegheny Valley mine run and $1.50@$1.75 for slack, which is scarcer than sizes, on account of the light Lake shipments.

Anthracite—The demand does not increase. The heat has been excessive for about six weeks, which is quite unusual here and it has kept the consumer who was in doubt from buying. It has been a task to keep consumers in the market anyhow, for there have been constant reports of the early reduction of rail freights rates and often of government interference on account of what has been called excessive prices and as at least some of these ideas are likely still to prevail, the buying will continue to be slow.

Lake—Shipments are heavy, though the present spurt is probably accidental. Loadings for the week were 185,900 tons, of which 97,400 cleared for Duluth and Superior, 42,400 for Milwaukee, 23,200 for Chicago, 9,400 for Port Arthur, 7,000 for Marquette and 6,500 for Racine.

Freight rates continue easy at $1 to Racine, 65c.@70c. to Chicago, 60c. to Milwaukee and 50c. to Duluth, Marquette and Port Arthur.

Coke—One or two circumstances favor at least a show of activity. The purchase of quite a block of iron ore is reported and the temporary starting up in August of one of the Wickwire

steel mills here obliged that company to buy 21,000 tons of furnace coke. Local prices remain $4@$4.35 for 72-hr. foundry, $3@$3.25 for 48-hr. furnace, $2.75 for stock with a trifle of domestic, chestnut size at $5@$5.25, adding $3.64 a ton to cover freight.

Northwest

DULUTH

Coal Embargo Looms — Anthracite Receipts Improve — Shortage Seen with Slow Inland Demand.

A coal embargo looms strongly as the only method to stop coal shipments and keep coal laden boats from filling the harbor, when the coal docks here become full to capacity, which will take place in about a week or ten days, unless some strong move comes to loosen up the market. Should the embargo become a reality, operators claim that a shortage of coal next winter at the Head of the Lakes region will be inevitable

The most conservative of estimators place the amount of coal on the docks now at more than 4,500,000 tons, and as the docks have only a maximum capacity of 5,000,000 tons a tie-up is momentarily expected.

The increase movement in anthracite last week has brought the hope that more hard coal will be shipped here in proportion than has been so far this year. A hard coal shortage has been feared even more than a shortage in bituminous.

Prices in soft coal are being held more firmly by dock men, who are reported to have refused $6.25 for Youghiogheny, Hocking and Splint lump, and to be demanding $6.50@$7. This shows a general trend of prices upward, which dealers claim will become more and more pronounced as the season advances.

What is spoken of as one of the heaviest movements of grain to the Head of the Lakes in years will begin about Aug. 15, and this will require every available freight car in the Northwest, and, in turn, will make heavy coal shipments from the harbor virtually impossible.

MILWAUKEE

Market Very Dull — Dealers Endeavor to Loosen Up Deliveries — Trade Now Guaranteeing Prices—Receipts by Lake Falling.

Dealers are out hustling for business from house to house and as a consequence local deliveries may be said to have improved slightly. Dealers are guaranteeing prices in order to assure doubting consumers who have been waiting for a decline in coal, especially in anthracite. Guaranteeing prices was popular before the war and it now looks as if the practice has returned to stay.

Jobbers of Illinois and Indiana soft coal are cutting car-lot rates in order to stimulate business. Talk of an impending increase of 25c. per ton in anthracite is still indulged in. Dealers argue that the present price of anthracite is not exorbitant. They say the Milwaukee price is based on the cost at the mines, plus the freight rate by rail ($6.58 per ton, plus a tax of 3 per cent). The difference between the all-rail rate and the lake-and-rail rate which Milwaukee enjoys, dealers hold is absorbed by dock handling charges and degradation. Egg is selling at $15.65, stove $15.90, chestnut $15.90, pea $14.05 and buckwheat $12.10.

Receipts by Lake have fallen away considerably, but there is promise of a fair inflow throughout the balance of the season. July's total will near the half-million mark, however. The season's receipts thus far aggregate 1,971,783 tons, of which 509,515 tons were anthracite and 1,462,268 tons bituminous. Last year, anthracite receipts footed up 365,161 tons and bituminous 583,344 tons, or 948,505 tons in all.

MINNEAPOLIS

Inland Buying Still Delayed — Docks Nearly Full—Car Shortage Seen with Grain Rush.

There is still very little sign that the coal buyers of the Northwest intend to take hold until they have to. Considerable publicity has been given the subject in the local papers, all of it urging early buying.

Despite all efforts of those in the trade and out, who feel an interest in the spreading of information on the situation, coal buyers persist in their strike. Usually at this time, there has been a reasonable movement to the interior. It is true that in the last two or three weeks, there has been a little improvement noted, but it is not up to normal, and even if it were, it would still leave a deficit from previous months.

Around this time, it used to be the theory that people should have coal sent from the docks in box cars, thereby moving the cars out for hauling grain back. But so far there has been very little done in this direction. In fact the outbound coal traffic is so light that dock men are beginning to worry lest they have to shut down on coal receipts. The docks have sufficient capacity for little better than half the usual requirements, hence if the docks are loaded but once, it means a shortage of dock coal of not far from 40 per cent of the winter's needs.

The tonnage served the Northwest from the docks is somewhat variable. The all-rail trade at times sells a larger tonnage than at others. During the past year or so, the dock business has been cut into by the all-rail trade, through the revised freight rates which hit the lake-and-rail trade harder than the all-rail. This has been adjusted by an allowance of 28c. on lake-and-rail coal since May, to last until Oct. 31, and the effect will be to extend the dock zone and cut into the all-rail zone. The all-rail people are quite aggressive at times, and have been known to go after tonnage and cut prices sharply. They may conclude to do this in reprisal, before the season is over.

Canada

TORONTO

Trade Very Quiet—Large Yard Stocks Accumulated—Shortage Probable When Demand Sets In.

There is little current demand either for anthracite or bituminous and the accumulation of coal in the yards has taxed the storage capacity to the limit, resulting in a decrease of mine shipments. The public is still holding back orders for fall and winter supplies, and dealers are apprehensive that when the cold weather sets in there will be a rush of orders and probably a shortage in the supply. Meanwhile, the carrying of large stocks, with limited storage facilities, is putting the trade to much inconvenience.

Quotations are as follow:

Retail:	
Anthracite egg, stove, nut and grate	$15.50
Pea	14.00
Bituminous steam	11.00@11.50
Domestic lump	12.25
Cannel	16.00
Wholesale f.o.b. cars at destination:	
¾-in. lump	8.00@8.50
Slack	6.00@6.75

Inland West

CLEVELAND

Slack Shortage Develops as Prices Rise — Lake Movement Tending to Slow Down — Slight Gain in Industrial Demand.

Bituminous—Something akin to the old time "scarcity market" has developed in the slack situation this week. A few of the largest producers of lump coal for Lake shipment have curtailed their output sharply with the result that the supply of slack is inadequate. The demand for some months has been on a hand-to-mouth basis and now that supplies have suddenly vanished may consumers are finding themselves in difficulties.

A slightly better demand is beginning to be apparent from industrial consumers, reflecting the somewhat more confident feeling that is beginning to be felt. No sharp revival is expected, but coal men assert that the corner has been turned and predict a gradually rising demand throughout August, with a more pronounced gain during the autumn months.

Lake—While there is much talk about curtailment of shipments to the lower ports for the Northwest trade, and many indications that this is being done, yet the aggregate tonnage arriving at the ports is still heavy. Arrivals at the first of the week were unusually large. The sentiment among operators is that the movement up the Lake will show a decline in August unless efforts now being made in the Northwest to move coal from the docks are successful. According to reports reaching the trade

here, dealers at the Upper Lake ports are engaging in a price war in an endeavor to reduce their stocks.

Pocahontas and Anthracite—As the season advances the retail is gathering more confidence. It is realized that the purchase of fuel for next winter cannot be postponed indefinitely.

Retail prices for coal delivered follow: Anthracite—egg $14, chestnut and stove, $14.25; Pocahontas — shoveled lump, $11.50, mine run $9.50; domestic bituminous, West Virginia Splint, $9.25; No. 8 Pittsburgh, $7.75; Cannel lump, $11.50; Steam coal, No. 6 and No. 8 mine run, $5.50; No. 6 and No. 8 slack, $5; No. 8 ¾-in. lump $5.50.

Receipts of bituminous coal for the week ended July 23, were 484 cars, divided; industrial, 369, retail 115; as compared with a total of 688 cars the previous week.

DETROIT

Little Demand Apparent — Industrial Conditions Unimproved — Anthracite Business Nil.

Bituminous—There are as yet few indications of an early realization of better market conditions. Both steam and domestic consumers are still delaying the releasing of orders for their winter supply.

Buyers are being advised to place their orders at once that they may have the benefit of the favorable transportation conditions in obtaining prompt delivery of shipments. A little further delay, in the opinion of jobbers, will result in uncertain movement of shipments owing to the pressure of crop movement on railroad facilities.

Dealers are of the opinion that the reduction in freight charges, announced recently by the Interstate Commerce Commission, on rail-lake shipments to be moved by boat from Lake Erie ports, is unlikely to produce any cheapening of coal for Detroit consumers. It is thought the lower freight rate may have a tendency to stimulate shipments over Lake routes, which have been diminishing during recent weeks.

West Virginia lump is quoted $3.25@$3.50, mine run $2.25@$2.50, nut and slack $2@$2.25; Ohio lump $3@$3.25, mine run $2@$2.25, nut and slack, $1.15@$1.25; smokeless lump and egg, $5.25@$5.50, mine run $3@$3.50, nut and slack, $2@$2.50.

Anthracite—Little business in prepared sizes is being done by retail dealers. While the lack of orders is due in part to the public's unwillingness to pay what it regards as high prices, lack of employment, also is a factor in curtailing domestic buying.

COLUMBUS

Strength in Screenings — Domestic Demand Weaker—Lake Tonnage Declines —Production Suffers.

With the Lake trade waning and little demand for domestic sizes, screenings are showing more strength because of reduced production. Screenings from all fields in Ohio are selling $1.25@$1.40. Other steam grades are not showing much strength with mine run quoted $2@$2.25 in most of the fields.

The buying public feel more and more that freight rates will be reduced and are still holding off on the purchase of their winter fuel supply. Retail prices are steady at former levels with Hocking lump selling around $6.50, and West Virginia splints $7.50@$7.75. Pocahontas is not as strong and sells around $9.50@$9.75. Anthracite is around $15.

The Lake trade is showing signs of the expected let-up which was freely predicted several weeks ago. The H. V. docks at Toledo during the week ended July 23 loaded 122,328 tons as compared with 165,763 tons the previous week, making a total of 2,228,170 tons for the season. During the same week the T. & O. C. docks loaded 66,629 tons as compared with 28,853 tons the previous week, making 594,037 tons for the season.

Production is being reduced to about 20 or 30 per cent. The Hocking Valley is producing but 20 per cent of normal while the same percentage is reported from Crooksville, Cambridge and Jackson. In the Pomeroy Bend field the output is less than 25 per cent.

CINCINNATI

Slack Coal Weakens Again—Pocahontas Softer—Retail Prices Fairly Stable.

Slack prices which have shown a disposition to strengthen under the influence of a curtailment of the demand for prepared sizes could not maintain the advantage that they gained last week and have sagged again. This with the prepared selling at the new low figures again places the aggregate returns at a new low level. Pocahontas lump has shown its first sign of weakness for the past two months. More mines are reported closed in the southeastern Kentucky fields. New Lake business here is practically nil. Country inquiries have sloughed off to the lowest ebb yet.

Lighter speculative business at Tidewater and lightening of the seaboard demand is given as the cause for reducing the price of slack to $1.25@$1.50 once more from the West Virginia fields. Kentucky slack can be had from $1@$1.25. Mine run is priced $1.50@$1.75. Kentucky operators still hold to their price of $3.25@$3.50 for lump and block and good West Virginia offerings can be had for $2.75@$3.

Pocahontas and New River companies shipping heavily on contract are holding egg and lump at $5.25@$5.50 though they have reduced nut to $4.25. Spot offerings of smokeless lump of good grade and quality have been made at $4.50@$5. Circular prices on mine run hold to $3.50 with sales from $2.75 up. Slack is not being quoted but sales from smaller mines have a range of $1.75@$2.50.

Retail prices are much on the same plane as last week, though some of the firms are playing with the rise and fall of the bituminous slack market. Some sales this week have been made as low as $4.35. Smokeless lump is quoted $9.75@$10.25, mine run $7.50@$8 and screenings $6.50. Bituminous lump $7.25, and mine run $5.75.

ST. LOUIS

Domestic Still at Standstill — Country Movement Slightly Improved — Screenings Show Activity.

Aside from a little hard coal there are no domestic deliveries locally. What inclination there was to buy on the part of the consumer was smothered by the extreme hot weather. Reports from country towns show some little activity in the movement of domestic. A few apartments in St. Louis are finishing up on their needs and the schools are about filled. This contract calls for Standard coal which is coming, it is understood, from a mine near Duquoin.

Screenings, in the steam sizes, is all that has picked up. This start ought to continue for the better unless domestic begins to move. Some few steam plants are getting a little coal ahead.

Anthracite receipts at the St. Louis gateway for this season to Aug. 1 will approximate 60,000 tons. This would indicate that the total to the end of the year will be around 85,000 to 90,000 tons. The movement to date is considered good in view of the headway being made by coke in the St. Louis territory.

Southwest

KANSAS CITY

Market Quiet — Steam Coals Feel Oil Competition — Prices Firm.

There is little or no change in the market situation. Demand for domestic grades has slackened off a trifle and steam plants continue to change from coal to oil, some of the large packing companies having changed to oil recently. It seems, however, that fuel oil production is about sold up, as the market is stiffening and some plants are unable to make long time oil contracts. Prices f.o.b. mines remain unchanged.

South

BIRMINGHAM

Market Extremely Quiet—Small Mines Keep the Market Glutted — Trade Requirements Show No Increase.

Trade conditions are not such as to afford much encouragement for better buying in the near future. Industrial recuperation is very slow and hardly noticeable and thus the demand from this source is negligible. Outside of the railroads and utility companies very little contracting has been done and the spot market is being depended on for supply to meet current needs. Spot buying is not sufficient to stimulate

the trade to any extent but only suffices to enable consumers to get their coal at almost their own price.

Quotations on mine run are reported as follows: Carbon Hill $2@$2.40, Cahaba $2.50@$3, Black Creek $2.75@$3, Pratt $2.50@$3, Corona $2.25@$2.50, Nickle Plate $2.25@$2.50, and Jefferson $2.25@$2.50.

Domestic coal is now being moved with more or less difficulty on account of the retail trade being practically at a standstill as consumers decline to place orders. Quotations for August show a slight advance over July in accordance with the usual custom of increases during the summer months. Figures are as follows: Carbon Hill $4.15, Cahaba $5@$6, and Black Creek $5@$6.

Production will be somewhat increased and employment conditions improved by the announcement of the Woodward Iron Co. of its intention to blow in another furnace early in August.

LOUISVILLE

Production Showing Very Little Improvement—Screenings Stronger—Industrial Stocks Getting Low.

Markets are somewhat stronger than they have been as a result of slow movement of prepared sizes forcing higher prices on screenings. West Virginia screenings, which have been selling down to $1 and less are today going at $1.50@$1.60. Hazard screenings are fairly firm at $1.25@$1.35, and Harlan is quoting $1.60@$1.75.

All prices are somewhat better than last week when there were quotations of $2.75 and under on some eastern Kentucky prepared, and when screenings were quoted as low as $1.

Orders are coming a little better as a result of industrial consumers having used up stocks in hand, and being forced to buy. Many of them have been running their bunkers down to a very low point.

There is no general improvement shown in any one class of industrial buying, and the retailer demand continues slow as the domestic consumer is putting off his buying.

West

DENVER

Prices Increase, but Demand Lags—Mines Suffer Heavy "No Market" Losses.

Prices are looking up while production, compared with a year ago, shows a weekly decrease of 80,000 tons. The more optimistic business men believe that industrial activities will recover shortly.

The great item going to make up "lost production" is lack of orders, totaling 42 per cent of possible full-time output for the week ended July 16, when 144,550 tons were mined.

Aug. 1 the mine price on lignite increased 25c. and the increase was carried to retail markets, where a price of $9 was asked on a mine basis of $3.75. Cheaper grades are retailing at $6.35@$8.50.

Bituminous shipments have been slow, but lignite demands have been even fewer. Routt County lump is retailing $11@$11.50, and southern Colorado grades $10.50@$11, while nut is 50c. cheaper.

There are approximately 13,500 miners on the payrolls—the average employed throughout the year—but companies in many places are unable to do more than give them part time week.

News From the Coal Fields

Northern Appalachian

ANTHRACITE

Dull Period Anticipated—Independents Cut Prices—Steam Sizes Pile Up.

Operating conditions were not so satisfactory last week and producers seemed to be looking forward to a very dull period during the next thirty days. The mines are all being operated, but while the tonnage produced shows no material decrease, no pick-up in the market is looked for until after Sept. 1.

It is probable that all of the large companies will continue to work full-time, although independents are being forced to close down, despite the fact that they are shading their prices.

EASTERN OHIO

Production Increases — Slack Stronger — Heavier R.R. Tonnage — Rate Cut May Help Lake Business.

Production during the week ended July 23, ran counter to the recent downward trend and registered an increase over the preceding week of some 31,000 tons. Aggregate tonnage mined was 396,016 tons, or 63.4 per cent of the total rated capacity.

Production figures for the year to July 23, indicate a total of 9,564,890 tons, or 53 per cent of rated capacity. This is at least a million tons ahead of last year when the output was curtailed by an acute car shortage.

The Association mines worked 53.1 per cent of possible worktime as compared with 51.1 per cent the preceding week, and produced 63.6 per cent of capacity.

There is a slight improvement being felt in Ohio industry, and this with continued fairly heavy shipping of Lake coal and also some better demand from the carriers, explains why production is holding up in the face of many predictions that a slump was at hand. The railroads took at least 35 per cent of production last week and a continuance of this ratio may be expected because of anticipated stocking-up and greater fuel needs of the roads to handle fall traffic.

The enlargement of the Lake destination territory to which the 28c. per ton allowance applies, thereby resulting in reduction in the rail rates Aug. 1 to certain upper Lake ports not heretofore enjoying it, may bolster the declining Lake tonnage. The railroads have about 14,000 cars at the Lake front, with some 3,000 cars in transit.

Operators say that the general industrial demand remains quiet and that both spot and contract inquiries are slow, with the latter rather negligible. Spot prices remain much the same with the exception of slack, which has stiffened during the week.

PITTSBURGH

Demand Extremely Light — Business Going to Non-Union Fields—Wage Subject May Be Reopened.

Demand continues extremely light and has probably decreased further in the past week or two. Lake shipments have now dropped to relatively small proportions. With a little general business going, the district can only occasionally sell coal, on account of the competition of non-union fields nearby, particularly the Connellsville region, which has had such a large wage reduction.

While one would probably have to pay $2.10@$2.20 for Pittsburgh district mine run steam he can easily get Connellsville coal at $1.80@$1.90 and there are lots of Connellsville or other coal to be picked up at lower prices, down to about $1.50.

There are no indications that demand is on the verge of increasing and there is nothing definite to suggest that the district is likely to have a lower production cost in the near future. Operators in central Pennsylvania have addressed the union officials in that field with a suggestion that the wage matter be opened, to pave the way for more activity. Nothing of this sort can be seen to be brewing in the Pittsburgh district.

Prices are largely nominal, there being scarcely any transactions, and are approximately as follows: Slack, $1.60@$1.75; steam mine run, $2@$2.15; ¾-in. steam, $2.25; gas mine run, $2.20@2.35; gas lump, $2.60@$2.80. Slack has advanced on account of decreased production of ¾-in.

CONNELLSVILLE

High Quality Coke Sold—Little Room for Further Decline — Spot Foundry Demand Improved.

The report a week ago that a Buffalo steel concern made a purchase of 15,000 tons of furnace coke each for August and September at about $2.75 proves erroneous. The trade arrived at the

price by considering offers at $2.80@$2.85 that were refused. It turns out that during the negotiations some strict stipulations as to quality were introduced and the period was reduced from the original two months, the outcome being that the business was placed with a dealer at $3 net to the consumer, the dealer placing it with producers at $2.85@$2.90. The Robesonia business, previously reported as being at $3.25 to the buyer, is learned to have been at $3 to the producer, though on account of certain special conditions some middle interests figured in the transaction. The coke is under very strict specifications.

Spot furnace coke usually brings about $3 when sold by brokers, but operators have accepted less in many cases, and in one extreme instance a lot of several thousand tons went direct from producer to consumer at $2.75, this being the lowest done.

Recent transactions have been on the basis of the further reduced wage scale of July 1, and it looks as though the market has little if any room for further decline.

Spot foundry coke has improved further in demand, though the market is still distinctly light, and is quotable as follows: Spot furnace, $2.90@$3; contract furnace, $3; spot foundry, $4@$4.50.

The *Courier* reports production in the week ended July 23 at 7,900 tons by the furnace ovens, and 13,620 tons by the merchant ovens, making a total of 21,520 tons, an increase of 40 tons.

UPPER POTOMAC

Mines Still Marking Time—More Operations Suspended—Prices Very Soft.

Upper Potomac and Georges Creek mines were still marking time to a great extent during the week ended July 23, there being no developments to stimulate production in either field. If anything, the output was even more restricted, with mines in larger number shut down awaiting a change in the market situation.

CENTRAL PENNSYLVANIA

Hand-to-Mouth Buying—Mines Unable to Meet Non-Union Competition—U. M. W.'s Refusal to Consider Reduction Closes More Operations.

A combination of circumstances seems to present an impregnable front against the efforts of the operators and an even deeper slump characterized the output during the month of July than up to the end of the first six months of the year.

There is no disposition on the part of industrial or domestic consumers to place orders for any considerable quantity of coal. Operators seem to be waiting, hoping for better prices or a reduction of the scale so that they can compete with non-union fields which have gone back to the 1917 scale. It is felt that economic conditions throughout the country demand cheaper coal and the operators are not in position to offer it. Consumers are perfectly satisfied to buy as they need coal, on the open market, at the prices ruling from time to time.

A leading operator states that the district is losing heavily as a result of the United Mine Workers' failure to consider a reduction. This operator states that his company must drop a contract on Aug. 4, which amounts to 120,000 tons a month because non-union mines can underbid his company by 60c. Union miners refuse to consider a modification of the scale and then, when a mine is forced to close down, they go into the non-union fields and work on the 1917 basis.

UNIONTOWN

Industrial Conditions Encouraging — More Plants Resume Work — Steady Improvement Seen.

Industrial conditions in the Connellsville coke region during the past two weeks have assumed an encouraging aspect and the belief that the industry has seen the worst of the depression is steadily attracting more advocates.

Here and there a number of the smaller mines are getting back to an operating basis although the nature of the business they received which justified resumption has not yet been established. In addition quite a few of independent coke plants are now engaged in mining coal for shipment to byproduct plants.

There is now basis for the opinion held by any number of operators and observers that conditions will gradually become better until a complete resumption is again at hand. The improvement of the past two weeks is sufficiently indicative that business is slowly but steadily returning.

Most operators are trimming their sails for fairly good business during the last quarter commencing Sept. 1. There will be more business in August than at any time this summer but the expectation is that nothing worthwhile will be accomplished before Sept. 1.

FAIRMONT AND PANHANDLE

R.R. Tonnage Improves — Lake Shipments Continue to Decrease—Spot Market Still Listless.

Fairmont

Production increased slightly during the latter part of the week ended July 23. The output, or the bulk of it, was railroad fuel there being little general demand. However, a few more inquiries were being made and there was some discussion of future contract requirements.

Export shipments were light and comparatively little coal went to the Lake. Prepared sizes ranged $2.60@$3, mine run about $1.75, and slack $1@$1.25.

Northern Panhandle

More suspensions of operations were necessary as shipments to the Lake continued to decrease and the general spot demand remained very dull. There was almost no contract inquiry. Prices were only nominal, mine run $2.25, prepared $2.40@$2.60 and slack not over $1.25, with very little coal moving at any price, however.

Middle West

INDIANA

Somewhat Better Feeling Prevails, but Current Demand Is Unimproved — Industrial Inquiries Increase — Domestic Trade Sluggish.

Little change is recorded with the exception that industries are making more inquiries about prices. These have held steady during the past week, but this is attributed to the fact that they are as low as they can go. Screenings are still as low as $1.80 and some prices have been shaded down below this figure.

Continued hot weather is held responsible by the retailers for the poor demand for domestic coal. Generally in July there is some increase in the call for the better domestic grades from persons who are storing. So far this year the demand from this source is below normal. A rise has been predicted among retailers for Aug. 1, but up to the present time it appears that it will likely be Sept. 1 before such a rise takes place. The demand does not justify it at the present time.

Some of the Indiana utilities are making inquiries concerning prices. Little actual business has resulted, however. Railroad reports in the state show a few more cars moving and the general business outlook is more encouraging than it has been for weeks.

SOUTHERN ILLINOIS

No Noticeable Improvement Except on Screenings — Screened Sizes Accumulating — Poorer Working Time — No Price Increase.

The screenings situation shows up considerably better in the Carterville field. The 600 cars that were pooled between the big shippers and which went to Chicago packers and one other large food corporation, has helped to eliminate the screenings surplus. Some of the screenings that have been on the ground for many weeks past are now being loaded. The prevailing prices range from $1.25 upward, but on current business the tendency is to ask $2.85 and get as close to it as possible. Some operators are shipping nut out as screenings to relieve the situation when a screening order carries a good price.

Domestic orders are few. This applies to all territories, although more is moving northwest than elsewhere.

Independent prices range as low as $3 for lump and egg, and nut from $2.35 up. Mine run is $2.75 and screenings $1.25 upward. The independents are showing up perhaps a trifle better in working time, but their coal cannot at these prices mean other than a loss.

In the Duquoin field in Perry County conditions are not as good. Prices are in some instances lower. In Jackson County a better showing is made on time and price. At Murphysboro—the Big Muddy vein—one mine worked every day but one in June—another missed three days and July records are almost as good to date. Mt. Olive shows

no change from the report of last week.

The Standard field reports improvement in screenings and here and there a slight increase in movement of screened sizes. Railroad coal is moving better.

On July 22, the following report of "no bills" on hand will show why an advance can be expected on screenings unless the domestic tonnage begins to move: Southern Illinois, screenings, all sizes, 264 cars; prepared coal, all sizes, 2,161 cars; central Illinois, screenings, all sizes, 262 cars; prepared coal, all sizes, 684. This shows slightly over three cars of screenings and about twenty-one cars of domestic coal per mine on hand.

Up to the end of the month there was no announcement of any increase in the circular price of Carterville or Mt. Olive coal. Thus the top will be $4.05 for domestic sizes. Only a demand will bring an increase in the Standard field. It is understood that several operators in the Springfield district have announced an increase.

WESTERN KENTUCKY

Business Slightly Better—Prices Firm —Production Not Being Forced.

Operators are maintaining values and slowly getting better prices, through holding down production when the market cannot absorb it. The result is that the general situation is looking promising in view of the fact that operators are generally of the opinion that there will be an active fall and winter trade.

It is patent that the domestic consumer is going to be a late buyer this year, and some of the retailers are under the impression that there will be more coal bought in the dead of winter than at any previous time since before the war. As western Kentucky has always been a prominent prepared-size producer the outlook is for a heavy fall and winter business.

In the event of a heavy demand developing later for prepared sizes there is some speculation as to just what can be done with screenings if industrial demand does not show material improvement over present consumption.

Middle Appalachian

LOW-VOLATILE FIELDS

Production Declines — Export Tonnage Slumps—Gulf Mines Hindered by Blast —Prices Soft.

New River and the Gulf

New River production fluctuated between 13,000 and 17,000 tons a day during the week ended July 23. Conditions were becoming worse and more mines were closing down for lack of orders. Neither at Tidewater, Lakes nor Inland points had it been found possible to secure any desirable business and some of the largest concerns closed during the week. Little coal was being exported and even government shipments had been curtailed.

Very little Gulf coal was being produced as the main line of the Virginian had not been cleared of the debris from the blast set off at Maben. Hence, during the greater part of the week, mines were without transportation facilities. However, there was literally no market whatsoever at Tidewater or elsewhere. Export shipments had come to a standstill and Tidewater prices were as low as at any time during the year.

Pocahontas and Tug River

Loss of export business cut down Pocahontas production so that the output was not over 40 per cent, with "no market" losses aggregating about 300,000 tons weekly, as against a production of about 235,000 tons. Although few mines were closed down entirely, yet most concerns were limiting operations to about one-half a week. Contract coal only was being moved, there being no spot demand discernible. Under such conditions prices were not as firm, prepared averaging $4.50@$5, mine run $2.25@$2.75 and slack in slim demand around $1.75@$2.25.

Poorer demand caused Tug River production to reach new low levels, in view of the fact that it was no longer possible to send so large a tonnage to Tidewater or the Lake. Prices, however, were being maintained, although very little business was being closed either on a spot or contract basis.

HIGH-VOLATILE FIELDS

Steadily Waning Demand—More Mines Closed — Tidewater and Lake Outlets Poorer.

Kanawha

If anything there was even less of a spot market during the week ended July 23. The domestic call had disappeared almost entirely and contract orders were being further curtailed. Production did not reach more than 10,000 tons daily and more mines closed down indefinitely. Where mines were running at all two days was the maximum. The best mine run price was $1.75, with slack $1.10@$1.25. Prepared sizes were only bringing $2.50 @$3.

Logan and Thacker

Although Logan production was still on a larger scale than in other fields, it represented coal for storage rather than any general demand. However, "no bills" were on the increase. Lack of a Tidewater outlet and the slowing down of Lake shipments were affecting production to a great extent.

In the Williamson field a steadily waning demand cut down the production. However, the output was somewhat strengthened by the fact that more railroad fuel was being handled. No market losses were increasing rather than diminishing and prices were on about the same level as in other high-volatile regions, although but few sales were being made.

Northeastern Kentucky

Paralysis of production continued as a result of even more pronounced dullness. Industrial concerns still withhold steam orders in the belief that better prices may prevail and the market for domestic coal is also in a slump. Even railroads were using only a small proportion of the usual tonnage required. With less coal being prepared screenings were not so plentiful and ranged around $1.25; mine run averaged about $2 and prepared sizes $2.75@$3.25.

Virginia

Conditions remained virtually unchanged, there being a very poor market and production was curtailed to about 50 per cent. Few new contracts were being closed, and only those operations having live contracts were able to keep running. There was little demand for coke and scarcely any was moving.

Southern Appalachian

SOUTHEASTERN KENTUCKY

Steam Market Shows Better Tone— Domestic Demand Sluggish—Fall Rush Seen.

While there appears to be a little better tone to the steam market, the general situation remains unchanged. Nut and slack and other steam sizes are moving more readily than block, but so far the Straight Creek operators have been able to maintain a price of $3.50 @$3.75 for block, while good Harlan is being sold 50c.@75c. less. Nut and slack is being sold $1.60@$1.75, 4-in. steam $2 and straight mine run $2.25 @$2.40.

It is plain that domestic buying is far less than normal and operators are preparing for an inevitable rush of orders later on. Just what will become of resultant coals may be a problem, unless industrial consumption picks up in the meantime.

West

UTAH

Slight Improvement Noted in Coal Situation—Coast Trade Holding Up—Labor Conditions Excellent — No Industrial Improvement.

There is a little improvement in the coal situation, the first in many months, but this improvement is anything but marked. Dealers are of the opinion that business will not really pick up before the latter part of August. The head of one of the largest retail coal yards in Salt Lake City, with whom the correspondent of *Coal Age* discussed the situation, said he expects to see people glad to carry a few hundred pounds of coal home in their automobiles during the coming winter.

The Coast trade is holding up fairly well and the labor situation continues excellent. There is considerable coal in the Salt Lake City yards and those dealers who are in a position to do so are putting in all they can hold. There is no improvement in the industrial situation and no prospects of an immediate change.

MINE And COMPANY NEWS

INDIANA

John E. Cox, judge of the Vigo Superior Court, Terre Haute, has awarded Ross Mace judgment for $873 against the **Vandalia Coal Co.** Mace asserted in a complaint that the Vandalia Coal Co. had taken 25,900 tons of mineral and sulphur substance from his farm in Lost Creek township without his consent and permission.

KENTUCKY

T. C. Hughes, president of the Standard Harlan Coal Co., reports that his company has taken over the Harlan Gem Coal Co., located at Ages, in Harlan County, Ky.

The St. Bernard Mining Co. and the **W. G. Duncan Coal Co.** power plants are being put in parallel with a common line between the two stations. The excess power will be taken over by the Kentucky Utiliities Co. This energy will be used in mines, industrial plants and community use.

NEW YORK

Perry & Co., wholesalers, 300 Madison Avenue, New York, in a circular sent out to retail coal dealers say:

"It has been suggested to us that an annual 'clean-up week' would not be a bad idea for many a dealer's yard. Collect all the old scrap and call the junkman. Wash up the wagons and motor trucks, grease up all the wheels and machinery, oil and polish the harness. Give your horses a run in pasture, or a stand on blue-clay, and your motors a renovation. Paint up the entire plant, lock, stock and barrel. Take this opportunity to look prosperous. Ginger up your confidence in your own business; breathe success. Talk, eat and sleep business optimism. It is as contagious as the measles. It will reach your office and sales force, and filter through to your trade. 'Clean-up week means also cleaning up your office—burning a lot of old stuff that you have no further use for, and getting a new slant at those old outstanding accounts. Get after them and get the cash. It is all up to you, Mr. Proprietor; you must be the first victim of the epidemic."

OHIO

The Mohio Coal & Mining Co. with general and retail offices in Cincinnati and mines at McArthur, has passed into the hands of Receivers Fred O. Valentine and Arthur W. Moore, under orders of the Superior Court. This was caused by a suit of its president, Charles P. Malone, who sued for an accounting. Disagreements as to management is also told in the suit filed.

The Board of Education, City of Cleveland, has requested bids on 40,000 tons of coal, various grades, to take care of their requirements the coming winter. It is expected bids will be opened and contracts awarded in the near future.

PENNSYLVANIA

The Chartiers Creek Coal Co., of Pittsburgh has contracted with Roberts and Schaefer Co., for the reconstruction of the tipple at Canonsburg.

The Midway Coal Co., of Bridgeville, has contracted with Roberts and Schaefer Co., for the installation of machinery equipment for its new tipple at Midway.

The Clarksburg gas coal mine of the **Hillman Coal & Coke Co.** resumed operations on July 5, after being idle for several months.

The Alliance Coal & Coke Co. plant at Denbo, a short distance up the Monongahela River from Brownsville, was recently closed down indefinitely.

The Warnke Coal Mining Co. has notified the Secretary of the Commonwealth that it has made an actual increase in its capital stock from $75,000 to $100,000. The company operates in Lackawanna County.

Alicia No. 1 coal and coke plant and Alicia No. 2 coal mine, of the **Pittsburgh Steel Co.,** closed down indefinitely on July 1.

State troopers and county authorities are investigating the series of explosions which damaged a portion of the Donald mine of the **Consolidated Coal & Coke Co.,** near Masontown. Mine officials said no authorization had been given for use of explosives in the vicinity of the mine where the blast occurred.

There were ninety fewer fatal accidents during the first six months of this year than during the same period in 1920 in the bituminous mines of Pennsylvania, while in the anthracite region during the same period there were three more fatalities this year than last year. The number of serious non-fatal accidents—those incapacitating workers for sixty days or more—was reduced materially in both fields, there being 321 fewer non-fatal accidents among the bituminous mine workers and 159 less among the anthracite mine workers in 1921 than in 1920.

From Jan. 1 to June 30, 1920, according to figures tabulated by S. E. Button, Chief of Mines, there were 210 fatalities in the bituminous field, while during the corresponding period of 1921 the number was but 120. In 1920 there were 646 non-fatal accidents in the bituminous region as compared with 425 this year for the first six months.

Fire broke out in the Gallatin Mine of the **Pittsburgh Coal Co.,** near Monongahela City, on Tuesday morning, July 12. The cause of the fire is believed to have been a short-circuit caused by a roof fall. The company succeeded in sealing off the fire on Thursday, July 14.

The Buck Ridge Coal Mining Co., Knickerbocker Building, New York, of which W. J. Fallon, is president, is planning to double the output of its Buck Ridge colliery, at Shamokin. Three new slopes are being driven to reach coal deposits not exploited heretofore, and a 750-hp. boiler is being installed to provide more power.

UTAH

The Beehive Coal Co. is making application for a lease on 1,560 acres of coal lands west of Helper. They propose 10c. a ton royalty and $200,000 improvements during the first three years of the lease.

Niel M. Madsen and R. Y. Gibson have been granted a government lease under the royalty and improvement plan on a large tract of coal lands between Schofield and Clear Creek and adjacent to the Denver & Rio Grande R.R.

According to an opinion handed down by Attorney General Cluff, title to coal discovered on leased grazing lands may be passed to the state in instances where owners do not desire to pay taxes on the mineral. Cases have been brought to the attention of the State Board of Equalization in which persons acquiring land for grazing purposes have reported that coal deposits discovered on their land are of such an inferior quality or are so far from a railroad to give them little or no commercial value. In cases of this kind it is contended that the payment of a tax on the deposit makes the cost of grazing prohibitive.

WEST VIRGINIA

A deal has just been completed whereby the **Maine Collieries Co.,** backed by Eastern capital, is to take over a portion of the holdings of the **Bear Mountain Coal Co.,** in Barbour County. The purchasers expect to produce coal in the late summer or fall.

Fairmont and Connellsville people are principally interested in the newly organized **Peoria Coal Co.,** of Fairmont which has just been formed for the purpose of operating in Marion County with a capitalization of $125,000. Leading figures in the new concern are: Anthony Love, H. T. Spiker, of Connellsville, Pa.; A. J. Colborn, Osman E. Swartz and Ada Moore, of Fairmont.

The Hamil Coal & Coke Co., of Blaine, has contracted with Roberts and Schaefer Co., for the complete machinery equipment for its new tipple to be installed at Blaine.

Chairman Kenyon, of the Senate Committee on Education and Labor, has appointed the following sub-committee to investigate disorders in the West Virginia-Kentucky coal fields: Senators Kenyon, Iowa; Phipps, Colorado; Shortridge, California; McKellar, Tennessee, and Walsh, Massachusetts. The miners and operators are each allowed to present six witnesses in Washington, beginning **July 14.**

Fairmont Mining Machinery Co., Fairmont, directs attention to the fact that the statement in *Coal Age*, page 1065, issue of June 9, 1921, relating to the belt conveyor in the mines of the Chesapeake Coal Co., should have stated that at this mine there is a 300-ft. apron conveyor, elevating the coal from 100 ft. below the surface to the tipple height, instead of stating that the conveyor delivers coal about 200 ft. from the top of the hill to the tipple.

A small tonnage of Redstone coal is being loaded by the **Brewer-Harrison Coal Co.** but such coal is being loaded in the course of development as this company only began production a short time ago. The operation is about two miles east of Weston on the Pickens branch of the B. & O. The company was formed late last year and in the last few months has been engaged in putting in a new plant.

A tract of Redstone coal is being developed by the **Mudlick Coal Co.** on the Louis Bennett estate about one mile from Weston. The Mudlick company has progressed to a point in the installation of a new plant where it is now able to produce and load a little coal. Shipments are being made over the Richwood branch of the B. & O.

The Eastern Coal Co., a Cumberland (Md.) concern has acquired the operations of the **Mary Coal Co.,** located near Kingwood in Preston County, the consideration being in the neighborhood of $50,000. In purchasing the mine, the company also secured 125 acres of land in the Bakertown seam. From what can be learned the Eastern Coal Co. has negotiations under way for the purchase of additional mining property.

Operations at the plant of the No. 2 mine of the **Irona Coal Co.,** located on the Morgantown & Kingwood R.R. near Kingwood, were resumed recently, this company having secured a contract to furnish coal to the P. & R. R.R. The company is controlled by the J. H. Weaver interests of Philadelphia.

Favorable progress having been made on the preliminary construction work for a new plant of the **McHale and Talbott Coal Co.,** the company has begun work on the installation of a siding at its plant not far from Philippi in Barbour County. Principal stockholders in the new concern are E. T. McHale, Donald Talbott and Brown Talbott, all of Elkins, at which point the company's office is located. This concern will be in readiness to begin operations about **Sept. 1.**

Clay County is to be the seat of operations of the newly organized **Kanawha White Ash Collieries Co.,** which is capitalized at $250,000. This concern expects to operate on a fairly large scale at Dorfee in Clay County. Pennsylvania people, in large part, are behind the new concern, among them being: E. M. Burns, of Ebensburg; F. J. Foye, J. J. Caulley of Brownsville; F. E. Williams, of Buckhannon and A. J. Horan, Charleston.

WYOMING

The Union Pacific Coal Co. notified several Wyoming coal dealers that the price of their coal would be increased 25c. a ton July 1 and another 25c. on Aug. 1. The reason given for the raise is that mining costs and operating expenses are still high. It also is stated that orders for coal have fallen off to such an extent that most of the mines are working only two days a week, and some only one, but overhead expenses go on just the same.

Traffic News

In the complaint of the **Gillespie Coal Co.**, the I. C. C. decides that the rates on coal from complainant's mine at Gillespie, Ill., to interstate destinations are not unreasonable but are prejudicial, which prejudice the commission orders removed.

The I. C. C. has denied the application of certain railroads to continue rates on coal and coke from Illinois and Indiana to points north and west without observing the long-and-short-haul clause.

The I. C. C. has authorized the Huntingdon & Broad Top Mountain Railroad & Coal Co. to assume obligation for $300,000 in notes to procure locomotives and passenger cars.

In the complaint of the **Illinois Steel Co.**, the I. C. C. decides that rates on coke from coke ovens to points in the company's plant at Gary, Ind., in 1918 were unreasonable, and awards reparation.

Personals

E. R. Thompson, secretary and treasurer of the Federal Coal Co., whose office is in Chattanooga, Tenn., was in Pineville recently. He reports that business in his section is still dull, but things are looking better.

Jesse H. Nuzum, of Shinnston, superintendent of five mines of the Consolidation Coal Co., located at Shinnston and at Lumberport, W. Va., has tendered his resignation after having been connected with the company for a period of twenty-four years. Mr. Nuzum desires to devote his entire time to personal business.

W. S. Walker, for the past two years southwestern sales manager at St. Louis for the Peabody Coal Co., has resigned and bought a ranch at Medford, Ore. He is succeeded by **A. W. Hamilton**, formerly of the Hamilton Coal Co. of Chicago.

Colonel L. E. Tierney, of Powhatan, president of the Powhatan Coal & Coke Co., is spending the summer at a northern summer resort and is undergoing treatment, having been in very poor health for some time.

D. A. Lyon, supervisor of stations, and **George S. Rice**, chief mining engineer for the Bureau of Mines, are now in Alaska on a tour of inspection to determine in what manner the Bureau of Mines can best assist the territory's mining industry. It is proposed to divide the territory into four districts, each being in direct charge of a Bureau of Mines engineer. District 1 has been assigned to **Bert W. Dyer**, who also will continue to discharge his duties of Federal Mine Inspector of Alaska. This district embraces the South coast, including the Matanuska, Kenai and Bering River coal fields, the Copper River basin and, for the present, the Katalla oil fields and Southeastern Alaska. J. A. Davis will continue to serve as superintendent of the Fairbanks station and, in addition, will be in charge of District 2, which consists of the territory tributary to the government railroad from Seward to Fairbanks. District 3 consists of interior Alaska, comprising the Yukon and Tanana basins. This district has been assigned to K. T. Sparks, assistant mining engineer. District 4 is the Seward Peninsula. No assignment of an engineer for this district has been made as yet.

Trade Catalogs

C-H Iron Clad Solenoids—Cutler-Hammer Mfg. Co., Milwaukee, Wis. Publication 873. Pp. 4; 8½ x 11 in.; illustrated. Describing design, especially adopted for operating brakes, clutches, valves, etc.—Advertiser.

Pennsylvania Air Compressors and Vacuum Pumps—Pennsylvania Pump and Compressor Co., Easton, Pa. Form 101; pp. 16; 6 x 9 in.; illustrated. Describing line of air compressors and reciprocating dry vacuum pumps.—Advertiser.

Sullivan Drill Sharpeners—Sullivan Machinery Co., Chicago, Ill. Bulletin 72-E; pp. 32; 6 x 9 in.; illustrated. Description of compressed-air machines for hammer-forging drill-bits and shanks.—Advertiser.

Synchronous Motor Control Apparatus and Exciters—General Electric Co., Schenectady, N. Y. Bulletin 48032; pp. 12; 8 x 10½ in.; illustrated. Describing four main divisions of synchronous motor control apparatus-exciters, compensators, panels and rheostats.—Advertiser.

Association Activities

National Coal Association

On the Government Relations Committee of the Association, appointed June 1, 1921, are:

Ogle, A. M. (Chairman) president, Vandalia Coal Co., Terre Haute, Ind.

Bockus, C. E., president, Clinchfield Coal Corp., New York City.

Gallagher, Michael, general manager, M. A. Hanna & Co., Cleveland.

Guthrie, T. W., president, Hillman Coal & Coke Co., Pittsburgh.

Kooi, Peter, president, Sheridan-Wyoming Coal Co., Sheridan, Wyo.

Maloney, A. J., sales manager, Chicago, Wilmington & Franklin Coal Co., Chicago.

Houston, T. E., Houston Coal Co., 1516 Union Trust Bldg., Cincinnati.

Huff, Julian B., president, Keystone Coal & Coke Corp., Greensburg, Pa.

Cunningham, W. H., secretary, West Virginia Coal Association, Huntington, W. Va.

Barnum, Walter, treasurer, Pacific Coast Co., 50 Church St., New York City.

Brydon, J. C., president, Quemahoning Creek Coal Co., Somerset, Pa.

Davis, T. B., president, Island Creek Coal Co., 1 Broadway, New York City.

Quealy, P. J., president, Gunn-Quealy Coal Co., Kemmerer, Wyo.

Ramsay, Erskine, first vice-president, Pratt Consolidated Coal Co., Birmingham.

Watson, C. W., president, Consolidation Coal Co., New York City.

Arnold, Gohen C., Buckhannon, W. Va.

Heiner, Moroni, vice-president, United States Fuel Co., Salt Lake City, Utah.

Mahan, E. C., president, Southern Coal & Coke Co., Knoxville, Tenn.

Caperton, G. H., president, New River Coal Co., Charleston, W. Va.

The Railroad Relations Committee of the National Coal Association, appointed June 1, 1921, is made up of the following:

Mahan, E. C., (Chairman) president, Southern Coal & Coke Co., Knoxville, Tenn.

Andrews, W. L., vice-president, Consolidation Coal Co., Baltimore, Md.

Barger, D. H., Shawsville, Va.

Boyd, C. D., traffic manager, Hazard, Harlan and Southern Appalachian Coal Operators' Associations, 705 Republic Bldg., Louisville, Ky.

Buffington, W. P., traffic manager, Pittsburgh Coal Co., Pittsburgh.

Francis, J. D., vice-president, Island Creek Coal Co., Huntington, W. Va.

Gunter, L. C., Stoney Fork Collieries Co., Knoxville, Tenn.

Hurd, D. F., secretary Pittsburgh Vein Operators' Association of Ohio, Cleveland.

Hutchinson, S. Pemberton, president, Westmoreland Coal Co., Philadelphia.

Jenkins, C. H., secretary and treasurer, Hutchinson Coal Co., Fairmont, W. Va.

Jones, J. S., president, Sunday Creek Coal Co., Outlook Bldg., Columbus.

Marion, A. M., president, Chartiers Creek Coal Co., 928 Park Bldg., Pittsburgh.

McElwain, John, vice-president, W. J. Rainey, 52 Vanderbilt Ave., New York City.

Moderwell, C. M., general manager, O'Gara Coal Co., 910 Fisher Bldg., Chicago.

Mouser, Otis, vice-president, Stonega Coke & Coal Co., Big Stone Gap, Va.

Reed, G. W., vice-president, Peabody Coal Co., McCormick Bldg., Chicago.

Taylor, C. W., vice-president, W. G. Duncan Coal Co., Greenville, Ky.

Waffle, Jonas, secretary, Indiana Coal Trade Bureau, 609 Trust Bldg., Terre Haute, Ind.

Warner, C. E., traffic manager, Southwestern Interstate Coal Operators' Association, Keith & Perry Bldg., Kansas City, Mo.

Yerkes, S. L., vice-president and secretary, Grider Coal Sales Agency, American Trust Bldg., Birmingham.

Callahan, John, traffic manager, National Coal Association, Washington, D. C.

Recent Patents

Self-Operating Mine Door for Locomotives. Patrick J. Stanton, Lundale, West Va., 1,374,478. April 12, 1921. Filed Aug. 18, 1920. Serial No. 404,441.

Coal-Mining Machine. John D. Pugh, Harrisburgh, Pa., 1,374,525. April 12, 1921. Filed June 30, 1915. Serial No. 37,265.

Automatic Mine Door. Newton K. Bowman, Canton, Ohio, 1,374,547. April 12, 1921. Filed Feb. 14, 1920. Serial No. 358,673.

Mine Drill. George Juresisin, Wilkes-Barre, Pa., 1,374,744, April 12, 1921. Filed Sept. 19, 1919. Serial No. 324,794.

Coal-Handling Apparatus. John H. D. Peterson, Chicago, Ill., assignor to the Link-Belt Co., Chicago, Ill., 1,375,105. April 19, 1921. Filed Aug. 12, 1918. Serial No. 249,468.

Attachment for Coal Conveyors. C. G. Walker, Bramwell, W. Va., 1,375,988. April 26, 1921. Filed Nov. 3, 1919. Serial No. 335,410.

Drilling Machine. O. D. Norman, Spencer, W. Va., 1,376,028. April 26, 1921. Filed April 19, 1919. Serial No. 291,245.

Industrial News

Washington, D. C.—The Potomac Electric Power Co., of the District of Columbia, has reported that although it has been able to effect a small saving in the item of coal in the present contract price as compared with the average price of the preceding year, the total reduction in operating costs therefrom amounts only to about $38,000, or a reduction in the cost of production of one-fortieth of one cent per kilowatt hour generated.

Washington, D. C.—Secretary Denby of the Navy Department, as a precaution to insure sufficient coal for the navy, has endorsed a bill pending before the House Naval Committee which would authorize the commandeering of coal for the navy upon order of the President.

Coming Meetings

The Huntington Coal and Industrial Exposition will be held in the Chamber of Commerce Building, Huntington, W. Va., Sept. 19 to 24 incl. Chairman of committee, Thomas A. Palmer, Huntington Chamber of Commerce, Huntington.

American Institute of Mining and Metallurgical Engineers will meet at Wilkes-Barre, Pa., Sept. 12 to 17. Secretary F. F. Sharpless, 29 West 39th St., New York City.

National Association of Cost Accountants will hold its annual convention at Cleveland, Ohio, Sept. 14, 15 and 16. Secretary, S. C. McLeod, 130 West 42d St., New York.

The American Mining Congress and National Exposition of Mines and Mining Equipment. The twenty-fourth annual convention on Oct. 17 to 22 at the Coliseum, Chicago, Ill. Assistant secretary, John T. Burns, Congress Hotel, Chicago, Ill.

The West Virginia-Kentucky Association of Mine, Mechanical and Electrical Engineers will hold its annual meeting at Huntington, W. Va., on Sept. 20 to 23. Secretary-treasurer, Herbert Smith, Huntington, W. Va.

The following first-aid meets will be held during August: The Davis Coal & Coke Co., first-aid and mine rescue meet at Thomas, W. Va., on the 3d. The State of Iowa will hold its annual first-aid and mine-rescue meet on the 6th at Albia. At Birmingham, Ala., state first-aid and mine-rescue meet on the 6th. Under the auspices of the Colorado Fuel & Iron Co. a local first-aid and mine-rescue meet will be held at Pueblo, Col., on the 20th. The Stonega Coal Co. will hold its annual first-aid meet at Stonega, Va. on Aug. 8. The Lehigh Coal & Navigation Co., field day and first-aid meet on Aug. 13 at Greenwood Park, Hauto, Pa.

New York State Coal Merchants' Association, Inc. will hold its annual convention at Richfield Springs, N. Y., on Sept. 8, 9 and 10. Executive secretary, G. W. F. Woodside, 250 Arkay Bldg., Albany, N. Y.

Canadian Institute of Mining and Metallurgy will hold its annual Western meeting at Edmonton, Alberta, Canada, Sept. 14, 15 and 16. Convention secretary, T. B. Williams, 10,610 83d Ave., Edmonton, Canada.

American Manufacturers Export Association will hold its twelfth annual convention at the Waldorf-Astoria, New York City, Oct. 5 and 6. Secretary A. W. Willmann, 160 Broadway, New York City.

National Safety Council will hold its annual congress at the State House, Boston, Mass., Sept. 26 to Sept. 30 inclusive. Secretary, S. J. Williams, Chicago, Ill.